USDA

United States Department of Agriculture

Forest Service

United States Department of Interior

Bureau of Land Management

Office of Surface Mining Reclamation Enforcement

State of Colorado

Division of Reclamation Mining and Safety

May 2012

Draft Environmental Impact Statement

Federal Coal Lease Modifications COC-1362 & COC-67232

Paonia Ranger District, Grand Mesa, Uncompahgre and Gunnison National Forests

Gunnison County, Colorado

Sections 10, 11, 13, 14, 22, 23 T14S, R 90W, 6th PM

Cooperating Agencies:

Uncompahgre Field Office, Bureau of Land Management

Colorado State Office, Bureau of Land Management

Western Region, Office of Surface Mining Reclamation and Enforcement

Colorado Division of Reclamation Mining and Safety

Federal Coal Lease Modifications COC-1362 & COC 67232
Draft Environmental Impact Statement
Gunnison County, Colorado

Lead Agency: USDA Forest Service

Cooperating Agencies: Bureau of Land Management-Uncompahgre Field Office

Bureau of Land Management-Colorado State Office

Office of Surface Mining Reclamation Enforcement

Colorado Division of Reclamation Mining and Safety

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Abstract: The proposed action is to modify Mountain Coal Company's existing federal coal leases COC-1362 and COC-67232 by adding 800 and 921 additional acres (respectively) to ensure that compliant and super-compliant coal reserves are recovered and not bypassed. Action alternatives have been developed to address different regulatory frameworks related to possible post-lease development.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin

Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send Comments to:	**Grand Mesa, Uncompahgre and Gunnison National Forest** **Attn: Forest Supervisor** **2250 HWY 50** **Delta, CO 81416** **Email: comments-rocky-mountain-gmug@fs.fed.us** **Fax: 970-870-6698**
Comments Must Be Received:	**Within 45 Days of Notice of Availability of DEIS publishing in *Federal Register***

SUMMARY

The Grand Mesa, Uncompahgre and Gunnison National Forests and the Bureau of Land Management have analyzed the effects of modifying ArkLand's existing federal coal leases COC-1362 and COC-67232 by adding 800 and 921 additional acres (respectively) to them. The coal lease modification areas lie in portions of sections 10, 11, 13, 14, 22 and 23 of T.14S, R. 90W, 6th PM in Gunnison County, Colorado. The modification areas include National Forest System surface lands. The coal estate is administered by the Bureau of Land Management (BLM). This action is needed, to ensure that compliant and super-compliant coal reserves are recovered and not bypassed.

Consideration of this leasing action does not authorize mining activities or surface uses; these would be handled in separate permitting processes at a later time by other state and federal agencies after the coal is under lease.

Extensive public involvement occurred during the preparation of an Environmental Assessment for this same project. During that comment period, approximately 32,002 versions of email form letters were received from environmental groups (more detailed description in subsequent sections); 576 hardcopy/faxed form letters were received from local community members in four counties in support of mining in this area; 78 (mostly modified form letters) were received in response to this scoping effort. Issues ranged from support to opposition of coal mining, effects to Inventoried Roadless Areas, and global climate change. Most concerns dealt with post-leasing development. These issues led the agencies to develop the Proposed Action which has lease stipulations to protect surface resources including: cultural/paleontological resources, threatened/endangered species, Canada Lynx, raptors, big game winter range, water depletions, breeding birds, geological hazards, riparian/wetlands, subsidence, lease notices for presence of roadless, lease addendums for methane flaring/capture/use and new lease stipulations for visual resources.

Notice of Intent to Prepare and Environmental Impact Statement was published in the *Federal Register* on April 25, 2012. Approximately 830 copies of letters/emails informing interested parties (including state, federal, local agencies, tribes, environmental groups, and interested parties) of this intent were also sent out on April 25, 2012 inviting additional comments throughout the process.

Based upon the effects of the alternatives, the Authorized Officer for the Forest Service will decide whether or not to consent to the BLM modifying the subject coal leases and prescribe stipulations for protection of surface resources; the BLM will decide whether or not to modify coal leases, and include other stipulations for protection of mineral or other resources they deem necessary.

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TABLE OF CONTENTS

List of Tables and Figures

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

1.0 Document Structure

The Forest Service, Bureau of Land Management (BLM) and the Office of Surface Mining Reclamation and Enforcement (OSM) have prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

Chapter 1. Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agencies' proposal for achieving that purpose and need. This section also details how the agencies informed the public of the proposal and how the public responded.

Chapter 2. Alternatives, including the Proposed Action: This chapter provides a more detailed description of the proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This section also provides a summary table of the environmental consequences associated with each alternative.

Chapter 3. Affected Environment and Environmental Effects: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.

Chapter 4. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of EA.

Index: The index provides page numbers by document topic.

Appendices: The appendices provide more detailed information to support the analyses presented in the EA.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at Paonia Ranger District Office, Paonia Colorado or the Uncompahgre Field Office in Montrose, Colorado.

1.1 Process to Modify a Federal Coal Lease on National Forest System Lands

The process to modify a federal coal lease is complicated and includes the involvement of many different agencies. The table below briefly describes the process and which entity is responsible for each step.

Table 1.1 Process to Modify a Federal Coal Lease.

Leasing Step	Entity Responsible	Reference/Authority
No mining or surface disturbing activities are authorized during leasing.		
Submit Application to Bureau of Land Management (BLM)	Mining Company	Mineral Leasing Act of 1920 as amended by the Federal Coal Leasing Amendments Act of 1976 (as amended), the Energy Policy Act of 2005 and 43 CFR 3432.
Notify Surface Land Management Agency of nominated lands	Bureau of Land Management-State	Mineral Leasing Act of 1920 as amended by Federal Coal Leasing

Leasing Step	Entity Responsible	Reference/Authority
	Office	Amendments Act of 1976 (as amended), the Energy Policy Act of 2005 and 43 CFR 3432.3(d), and National level BLM/FS MOU and Interagency Agreement for Mineral Leasing.
The Surface Land Management Agency reviews the land in question and determines whether or not the lands applied for are Unsuitable for Mining.	Forest Service – Forest level, BLM	43 CFR 3461 and National Level BLM/FS MOU for Coordination of Activities Pursuant to the Federal Coal Program, GMUG Forest Plan.
Surface Land Management Agency determines whether or not to consent to BLM to lease lands applied for and prescribes stipulations for the protection of surface resources (for a lease modification generally those that apply to the parent lease).	Forest Service-Forest level	Mineral Leasing Act of 1920 (as amended), Federal Land Policy and Management Act of 1976, Coal Leasing Amendments Act of 1976 (as amended), the Energy Policy Act of 2005 and 43 CFR 3432.3(d), and NEPA
BLM considers Forest Service consent and makes determination whether or not to modify the leases	BLM-Field Office/State Office,	Mineral Leasing Act of 1920 (as amended), Federal Land Policy and Management Act of 1976, Surface Mining Control and Reclamation Act of 1977, Federal Coal Leasing Amendments Act of 1976 (as amended), the Energy Policy Act of 2005, and 43 CFR 3432
Lease acreage is added to lease	BLM- State Office	43 CFR 3432

1.2 Background of these Lease Modifications

The Bureau of Land Management Colorado State Office (BLM) notified the Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG) that ArkLand Company applied to modify existing federal coal leases, COC-1362 and COC-67232, by adding about 800 and 921 acres, respectively, to them. Coal in the existing leases is mined by Mountain Coal Company (MCC) from their West Elk Mine near Somerset, Colorado. ArkLand Company is the parent company of MCC. The applications were made to prevent bypass of federal coal reserves. The lease modification applications will be processed according to procedures set forth in 43 CFR 3432.

The coal lease modification areas lie in portions of sections 10, 11, 14, 15, 22 and 23 of T. 14S., R. 90W., 6th PM in Gunnison County, Colorado. The modification areas include National Forest System (NFS) surface lands managed by the GMUG. The coal estate is administered by the BLM Uncompahgre Field Office. Both lease modifications are shown on a map in Chapter 2.

Table 1.2. Coal Lease Modification Legal Descriptions

Lease Modification Tract	Location	Acreage
COC-1362	T. 14 S., R. 90 W., 6th P.M. • Sec. 10: SE, NESW; • Sec. 11: SW, S2NW; • Sec. 14: NWNW, NENW, W2SENW, SWNW, NWSW, W2NWSW; • Sec. 15: E2NE, N2SE;	800 acres more or less.
COC-67232	T. 14 S., R. 90 W., 6th P.M. • Sec. 11: SWNE,W2SE;SESE • Sec. 14: E2SENW, NE, SE, S2SW, E2NESW; • Sec. 15: SESE; • Sec. 22: E2NE; • Sec. 23: NW, NWNE;	921 acres more or less.

The BLM is required, by law, to consider leasing Federally-owned minerals for economic recovery. With respect to lands managed by the Forest Service, the agency considers consenting to the BLM leasing coal reserves underlying lands under its jurisdiction, and prescribes stipulations for the protection of non-mineral resources. In this instance, the Forest Service is considering consenting to BLM modifying ArkLand's existing federal coal leases COC-1362 and COC-67232 by adding 1,721 cumulative acres to them. The FS will also identify any needed stipulations to protect non-coal (surface) resources. If FS consent is given, the BLM would offer the modifications non-competitively.

If the lease modifications occur, the coal in this area would be accessed and recovered by underground longwall mining methods from the existing West Elk Mine. The coal would be transported using MCC's existing coal transportation system and surface facilities. At the leasing stage, the federal agencies evaluate the effects of subsidence (i.e. the land surface lowered as a result of mining) on surface resources, and identify where surface resources may require specific protection from subsidence or foreseeable surface uses. Under a foreseeable mine plan scenario, surface uses on these modifications may include, exploration, methane drainage wells (MDWs) and associated access roads required to safely mine the coal resources. Specific locations of the MDWs and roads are not known at the leasing stage, and will not be known until the time specific mine plans are approved by the State, BLM, MSHA and the federal Office of Surface Mining during the subsequent permitting process. However, in all alternatives that allow for surface use, this use is reasonably projected for cumulative effects analysis purposes in the NEPA at the leasing stage.

Approximately 1,450 acres of the modification areas are within the West Elk Inventoried Roadless Area (Sunset Roadless Area subset).

If the lease modifications are approved, temporary roads and timber cutting may be needed to construct, operate and maintain MDWs necessary to mitigate safety issues in underground mine. This leasing action itself does not authorize actual mining or any surface disturbing activities; however it does evaluate the need for stipulations for subsequent use of the land surface. In this case, stipulations on the existing leases would apply to the modifications, and include a lease notice for activities in roadless areas, which states that "…lands in the leases will be subject to all existing and future rules and regulations of the Secretary of Agriculture concerning management of roadless areas including restrictions on road-building."

1.3 Purpose and Need for Action

The GMUG and BLM have identified the need to consider issuing two coal lease modifications for federal coal lands immediately adjacent to exiting federal coal leases COC-1362 and COC-67232. The purpose of the lease modifications is to ensure that compliant and super-compliant (high quality or ones that have a high BTU, low-ash, and low moisture content) coal reserves are recovered.

The BLM, charged with administration of the mineral estate on these Federal lands, is required, by law, to consider leasing Federally-owned minerals for economic recovery. The USDA-Forest Service (FS), as the surface management agency, considers consenting to the BLM leasing reserves underlying lands under its jurisdiction, and prescribes stipulations for the protection of non-mineral resources. Under 43 CFR 3432 (as amended by the Energy Policy Act of 2005), the holder of a federal coal lease may apply to modify a lease by adding up to 960 acres. The federal agencies are responding to applications to modify existing leases.

The USDI- Office of Surface Mining Reclamation and Enforcement, Western Region will participate as a cooperating agency as it is responsible for the preparation of mining plans and oversees the subsequent permitting process.

The proposed action conforms to the overall guidance given in the GMUG Land and Resource Management Plan, as amended (USDA Forest Service, 1991) which encourages environmentally sound energy and mineral development, and the BLM Uncompahgre Basin Resource Management Plan (RMP; USDI BLM,1989).

1.4 Proposed Action

The proposed action is to modify MCC's existing federal coal leases COC-1362 and COC-67232 by adding 800 and 921 additional acres (respectively) to ensure that compliant and super-compliant coal reserves are recovered and not bypassed. Details of the Proposed Action and alternatives can be found in Chapter 2 (Section 2.1).

1.5 Decision Framework

Forest Service

The GMUG Forest Supervisor is the Authorized Officer for this discretionary consent decision on these coal lease modifications (FSM 2822.04c). Given the purpose and need, the Authorized Officer will review the proposed action, the other alternatives, and the environmental consequences in order to decide the following:

- Whether or not to consent to the BLM modifying existing Federal Coal Lease COC-1362 by adding 800 acres according to the Federal Coal Leasing Amendments Act of 1976 and whether or not to consent to the BLM modifying existing Federal Coal Lease COC-67232 by adding 921 acres according to the Federal Coal Leasing Amendments Act of 1976 (these leases are considered together based on information presented by the BLM in an alternative in Section 2.2 and Appendix A of this document);
- Prescribe stipulations needed for the protection of non-mineral resources by determining if the existing stipulations on the parent lease are sufficient. If they are not sufficient, prescribe additional stipulations that will provide for the protection of non-mineral resources.

The Forest Service Authorized Officer will determine if the activity is consistent with the GMUG Forest Plan.

The Forest Service decision will be made based on the analysis relative to the No Action and Proposed Action Alternatives.

BLM

The BLM is a cooperating agency for this EIS to respond directly to their role in the Federal coal leasing process which is tied to the mineral (not surface) estate. The BLM Colorado State Director/Southwest District Manager is the Authorized Officer for the BLM, and will decide whether or not to modify the existing coal lease under the Mineral Leasing Act, as amended, and the federal regulations under 43 CFR 3400. The Uncompahgre Field Office Manager is responsible for providing the Southwest District Manager/State Director with briefings and recommendations. Specifically, the BLM will decide whether to:

- Adopt the No-Action Alternative (no leasing);
- Adopt the coal lease modifications as applied for by the applicants (See Section 2.2 Alternatives Considered but Eliminated from Detailed Study, *Lease modifications as applied for by ArkLand Company/MCC* for reasons dismissed);
- Adopt an alternative with features of both of the alternatives; or
- Adopt the action alternative with additional mitigation measures (Alternatives 2 and 3).

BLM cannot issue leases without the consent of the surface managing agency.

OSM

OSM is a cooperating agency and may prepare a mining plan modification related to the subsequent permitting of these lease modifications.

1.6 Authorizing Actions

Mining and Minerals Policy Act of 1970 and Mineral Leasing Act of 1920, as amended

The Forest Service and BLM manage their minerals programs under guidance given in the Mining and Minerals Policy Act of 1970 which states in part that it is the "continuing policy of the federal government in the national interest to foster and encourage private enterprise in…(t)he development of economically sound and stable domestic mining minerals and mineral reclamation industries…(and) the orderly and economic development of domestic mineral resources…." Further, federal mineral leasing follows the Mineral Leasing Act of 1920 as amended by the Federal Coal Leasing Amendments Act of 1976 (MLA), and specific procedures set forth in 43 CFR 3400.

Federal coal leasing follows the Mineral Leasing Act of 1920 (MLA), as amended by the Federal Coal Leasing Amendments Act of 1976, and specific procedures set forth in 43 CFR 3400.

These lease modification applications are being processed according to procedures set forth in 43 CFR 3432. Lease modifications may be non-competitive leasing actions. In this case, ArkLand applied for these modifications to add acreage to existing leases and no other coal company could obtain the rights to the coal if it is approved; therefore, this is a non-competitive leasing action.

Subsequent permitting actions to allow mining and changing of the approved mine permit boundary to include the modification areas would be evaluated by the Colorado Division of Reclamation Mining Safety (DRMS) under procedures set forth in 30 CFR PART 906.30 Appendix B and the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining. These modifications may also require approval from the USDI through the Office of Surface Mining, Reclamation and Enforcement (OSM).

Energy Policy Act of 2005

The purpose of the Energy Policy Act of 2005 was to ensure jobs for the future with secure, affordable, and reliable energy.

This Act Amends 30 U.S.C. 203(c)(4)(A) to ``secure modifications of the original coal lease by including additional coal lands or coal deposits contiguous or cornering to those embraced in the lease…(3) In no case shall the total area added by modifications to an existing coal lease under paragraph (1)--(A) exceed 960 acres; or (B) add acreage larger than that in the original lease."

1.7 Conformance with Land Use Plans

The amended Land and Resource Management Plan (LRMP or Forest Plan) dated September 1991, for the GMUG National Forests made provisions for coal leasing subject to the application of the coal unsuitability criteria established in 43 CFR 3461 (Appendix B-*Unsuitability Analysis Report*). The LRMP also provided for applicable stipulations to be utilized for protection of specific surface resources as addressed in Section III, General Direction, pages 63-69 of the LRMP.

The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the GMUG. Management directions described in the Forest Plan are a result of public issues, management concerns, and management opportunities. Multiple use management area prescriptions as designated in the Forest Plan for the lands bounded by the proposed lease tracts are summarized below:

- 6B –Livestock grazing. Emphasis is on optimizing forage capability for livestock grazing. Other resource activities may occur, but should harmonize and blend with the natural setting.
- 5A – Big Game winter range in non-forested areas. Winter range is managed to produce wildlife habitat capability greater than or equal to 90 % of potential for a mid-seral or better condition. Compatible resource activities may occur.
- 9A–Riparian / Aquatic Ecosystems. Emphasis is on the management of all the components of aquatic/riparian ecosystems to provide healthy, self-perpetuating plant communities, acceptable water quality standards, and habitats for viable populations of fish and wildlife, and stable stream channels and still water body shorelines. Mineral activities may occur but must minimize disturbance to riparian areas and initiate timely and effective rehabilitation of disturbed areas and restore them to a state of productivity comparable to that before disturbance.

The proposed action conforms to the overall guidance given in the LRMP, as amended (1991), which encourages environmentally sound energy and mineral development. In compliance with the GMUG Forest Plan, the Unsuitability Criteria for coal mining in 43 CFR 3461 was applied to the coal lease modification areas. None of the lands were found to be unsuitable based on the criteria. No additional restrictions or need for stipulations were identified as a result of applying the criteria (Appendix A).

Leasing is also consistent with the BLM Uncompahgre Basin Resource Management Plan (RMP, 1989). This RMP determined that the areas subject to the lease applications and exploration license applications were to be managed for both existing and potential coal development. The area is acceptable for coal development and coal production, and such coal activities could occur without conflicting with other land uses as described in the RMP.

Upon receipt of the lease applications, BLM completed tract delineation. The assessment of coal unsuitability criteria has been completed for the proposed lease modification. The criteria have also been reviewed for implications with the other alternatives in this analysis. The unsuitability criteria published in 43 CFR 3461 were used. This coal unsuitability analysis report is included in this EIS document as *Appendix B-Unsuitability Analysis Report.* In addition, data adequacy standards were reviewed and determined to be adequate. Under 43 CFR 3400.3-3 (as well as 30 CFR 761), the Secretary of Interior may issue leases that authorize coal mining operations on Federal lands within the National Forest System, provided that such leases may not be issued on lands within a national forest unless the tract is assessed to be acceptable for all or certain stipulated methods of surface coal mining operations under the provisions of Criterion No. 1 in 43 CFR 3461.1. This states that (i) A lease may be issued within the boundaries of any National Forest if the Secretary of Interior finds no significant recreational, timber, economic or other values which may be incompatible with the lease; and (A) surface operations and impacts are incident to an underground coal mine. This documentation is provided by the BLM prior to

lease issuance per 30 U.S.C. Chapter 25, Section 1272-4(e)(2), 30 CFR Subchapter F- 761.11, Surface Mining Control Reclamation Act Section 522 (2) and 43 CFR 3461.5.

The RMP was amended to address the standards for land health (i.e., Standards and Guidelines). The land analyzed in the EIS project area is within the North Fork landscape unit. Briefly, Colorado BLM's Standards are:

- Ensure health of upland soils;
- Protect and improve riparian systems;
- Maintain healthy, productive plant and animal communities;
- Maintain or increase populations of threatened and endangered species in suitable habitat; and
- Ensure water quality meets minimum Colorado standards.

The RMP made provisions for coal leasing subject to the application of the 20 Coal Unsuitability Criteria (as established in 43 CFR 3461). Federal coal lands not meeting the standards required by each criterion are determined to be unsuitable for coal leasing. A number of criteria have exemptions and exceptions, and the application of these exemptions and exceptions may allow certain types of coal mining. The Forest Service prepared the Unsuitability Criteria for these lease modifications. It is included in this document as Appendix B.

1.8 Public Involvement

The Notice of Opportunity to Comment on the Environmental Assessment (EA) initially prepared for this project was published in *the Grand Junction Daily Sentinel* (newspaper of record) and in the *Delta County Independent* on April 21, 2010. The Notice of Opportunity to Comment asked for public comment on the proposed lease modifications from April 21-May 21, 2010. In addition, as part of the public involvement process, the agency sent out approximately 120 letters to state, federal, local agencies, tribes, environmental groups, and interested individuals; posted scoping materials to the GMUG's website; and posted to the Forest Service's Schedule of Proposed Actions.

During that initial comment period, approximately 684 versions of email form letters were received from Wild Earth Guardians supporters;1900 versions of email form letters were received from Defenders of Wildlife supporters; 23,771 versions of email form letters were received from supporters of Natural Resources Defense Council; 5647 versions of email form letters were received from supporters of Earth Justice; 576 hardcopy/faxed various form letters were received from local community members in four counties in support of mining in this area; 74 original or somewhat original comments were received; and 4 original comments with attachments were received in response to this scoping effort.

Using the comments from the public, environmental groups, other agencies, and those developed internally, the interdisciplinary team developed a list of issues to address (see *Issues* section).

The decision on that EA was issued in November 2011, was appealed December 2011 and was reversed in February 2012.

Notice of Intent to Prepare an Environmental Impact Statement was published in the *Federal Register* on April 25, 2012. Approximately 830 copies of letters/emails informing interested parties (including state, federal, local agencies, tribes, environmental groups, and individuals expressing desire to remain on mailing lists) of this intent were also sent out on April 25, 2012 inviting additional comments throughout the process but reminding them that to be eligible for appeal they must comment on Draft EIS when it became available. Additional notification was not sent out to those who submitted form letters through other groups' clearinghouse websites on the previously prepared EA except for those who submitted original or somewhat original comments. Forest Service's Schedule of Proposed Actions was also updated. Additional notification will be sent out with this Draft EIS.

1.9 Issues

The agencies have separated the issues into two groups: significant and non-significant issues.

Issues (Carried Forward in the Analysis)

Significant issues were defined as those directly or indirectly caused by implementing the proposed action.

Issues relating to the proposed lease modifications were identified based on the comments received during the public scoping process. These issues, along with issues raised by the Interdisciplinary Team (IDT), will be carried forward in the analysis:

Table 1.9. Significant Issues.

Topic	Issue	Where Addressed
Cumulative Effects	Surface disturbance other than from mining (subsidence) may occur as a result of mining.	Chapter 3
	Reasonably foreseeable impacts to the surface and other resources may occur as a result of mining.	Chapter 3
Mitigation Measures	Forest Service must evaluate the effectiveness of proposed mitigation measures.	As stated by the commenter, CEQ requires that mitigation measures should "be identified even they are outside the jurisdiction of the lead agency" and any measures that are "adopted" explained and committed. In this document stipulations are included as part of the Proposed Action in the form of Lease stipulations and are thus analyzed in detail.
Air Quality	Effects of the proposed action may occur on air quality including ambient ozone, $PM_{2.5}$, PM_{10}, VOCs, Class I areas in compliance with the Clean Air Act.	Chapter 3
	Include a stipulation related to particulate matter.	Chapter 2, Table 2.1a
	Cumulative effects to air quality associated with coal burning may occur as a result of the Proposed Action.	Chapter 3 Air Quality, Cumulative Effects
Roadless Character	Roadless character in the West Elk Roadless (and Sunset Roadless) Area may be affected either indirectly or cumulatively through consenting to lease and leasing.	Chapter 3
Methane	Alternatives to venting including flaring, capture and use, or destroying ventilation air (VAM) methane must be analyzed in detail.	Section 2.2.
	BLM lease addendum should be re-	This should occur during the

Topic	Issue	Where Addressed
	negotiated with Lessee to allow for flexibility related to addressing changes in law, regulation or policy as it relates to methane capture at the West Elk Mine. For example, if CDHPE determines that the Tailoring Rule applies to the West Elk Mine, additional mitigations may be required.	leasing process in cooperation with regulatory authorities.
Coal Reserve	Address the effects of adding coal reserves on coal resource recovery	Chapter 3, GER/MER-Appendix A
Socioeconomics	Coal mining activities are vital to the local and regional economies.	Chapter 3-Socio-economics
	Coal from the North Fork Valley helps fuel clean coal technology and provide the USA with low-cost, reliable energy.	Chapter 3-Socio-economics
Visual Resources	Removal of vegetation, ground disturbance and structures related to future surface facilities needed to manage methane may negatively impact visuals.	Chapter 3-Visuals
Wildlife	Removal of vegetation related to future surface facilities needed to manage methane may negatively impact Canada lynx.	Chapter 3, Biological Assessment, and USFWS consultation
Subsidence	Subsidence may affect water resources including local water quality and quantity.	Chapter 3
	Subsidence may affect wildlife habitat, including effects to riparian habitat.	Chapter 3
	Subsidence may affect cultural resources.	Chapter 3
	Subsidence may affect other land uses, including range improvements, cattle trails and other multiple uses of the land.	Chapter 3
Climate Change	Effects on climate change may occur from mining coal which stem from the release of methane through the mine ventilation system, release of methane through any gob vent boreholes and release of CO_2 caused by the burning of coal that is mined.	Chapter 3-Air Quality & Climate Change

Non-significant issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" These will be evaluated based on comments received during the comment period for this DEIS and documented in Response to Comments in an appendix in the FEIS.

1.10 Related Analysis

Per 40 CFR Part 1502 § 1502.20 and § 1502.21, this EA tiers to and incorporates by reference previous analysis and litigation conducted in the vicinity of the project area related to parent leases. Any and all materials related to this previous analysis may be further relied upon in the event of appeals or litigation.

1) Box Canyon Federal Coal Lease EA and DN, 1995. Document relates to cumulative effects.

2) Raven Gulch Coal Exploration License Environmental Assessment (EA) and Decision Notice and Finding of No Significant Impact (DN/FONSI), 1998. Document relates to cumulative effects.

3) Iron Point Exploration License, the Iron Point Coal Lease Tract and the Elk Creek Coal Lease Tract EIS ("North Fork Coal EIS") and Record of Decision. March 30, 2000. Document relates to cumulative effects.

4) Coal Lease Modifications for Federal Coal Leases C-1362 and COC-56447 EA and DN, 2001. Document relates to cumulative effects.

5) Coal Methane Drainage Project NEPA analyses and related decisions: Decision Memos from 2001; Panel 15 Methane Drainage Wells EA and DN/FONSI, 2001; Panels 16 to 24 EA and DN/FONSI, 2002; Sylvester Road Temporary Road Construction and Box Canyon Methane Drainage Wells EA and DN/FONSI, 2003. Document relates to cumulative effects.

6) West Flatiron Federal Coal Lease EA and DN/FONSI, 2003. Document relates to cumulative effects.

7) Mountain Coal Company Geotechnical Boreholes Decision Memo, 2006. Document relates to cumulative effects.

8) E-seam Development Methane Drainage Wells Decision Memo, July 2005. Document relates to cumulative effects.

9) Box Canyon Methane Drainage Wells Decision Memo, 2005. Document relates to cumulative effects.

10) Dry Fork Coal Lease-by-Application Final EIS, 2005 and Record of Decision, 2006. Document relates to cumulative effects and effects analysis on parent lease COC-67232.

11) Sylvester Gulch/Long Draw Supplemental EA and DN/FONSI, 2006. Document relates to cumulative effects.

12) Mountain Coal Company, Mining and Reclamation Plan for the West Elk Mine, including various consultants' reports on subsidence, vegetation, riparian resources, ground water, and Annual Hydrologic Reports on water monitoring (online at http://drmsweblink.state.co.us).

13) USGS and Colorado Geological Survey reports on the local area. Document relates to cumulative effects, existing and coal resource.

14) Deer Creek Shaft and E Seam Methane Drainage Wells Project FEIS August 2007 Records of Decision August 2007 (Shaft), November 2007, March 2008 and Errata January 2008. Documents relate to cumulative effects, methane capture and existing condition of the affected parent leases.

15) Civil Action No. 08-cv-02167-MSK, WILDEARTH GUARDIANS, a not-for-profit corporation, Plaintiff, v. UNITED STATES FOREST SERVICE, a federal agency within the U.S. Department of Agriculture; CHARLES S. RICHMOND, in his official capacity as Supervisor of the Grand Mesa, Uncompahgre, Gunnison National Forest; UNITED STATES DEPARTMENT OF THE INTERIOR, a federal agency; WILMA LEWIS, in her official capacity as Assistant Secretary, Land and Minerals Management, U.S.

Department of the Interior, Defendants, and MOUNTAIN COAL COMPANY, Intervenor-Defendant. OPINION AND ORDER AFFIRMING AGENCY ACTION, October 31, 2011. Document relates to case law affecting the parent leases and methane and would directly apply to future development of the lease modifications.

16) Federal Coal Lease Modifications COC-1362 and COC-67232 EA November 2011. And appeal of same. This EIS relies on this analysis, appeal points, and decision reversal and the comments received on this project are needed to satisfy the scoping requirements of this EIS.

17) Elk Creek East Tract Coal Lease COC70615 EA DOI-BLM-CO-150-2008-53, 2010.

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CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.0 Introduction

This chapter describes and compares the alternatives considered for the lease modifications. It includes a description and map of the action alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision makers. Information used to compare the alternatives is based upon the environmental, social and economic consequences of implementing each alternative.

2.1 Alternatives Considered in Detail

The three alternatives were developed:, the No Action (Alternative 1), Proposed Action (Alternative 2 Consent to Lease under the 2001 Roadless Area Conservation Rule Framework), and Alternative 3 Consent to Lease under the Colorado Roadless Rule Framework), in response to issues raised by the public.

Alternative 1-No Action

Analysis of the No Action alternative is required by CEQ 40 CFR Part 1502.14(d). Under the no action alternative, the lease modifications would not be approved, and no mining would occur in these specific areas. Impacts from mining coal under these areas would not occur on these lands, and the effects from on-going land uses could continue including coal mining activities such as exploration and monitoring related to mine activities on existing leases, continued recreation and grazing. The land would continue to be managed according to Forest Plan standards, goals and guidelines.

Proposed Actions Common to Alternatives 2 & 3

The proposed action is for the Forest Service to consent to BLM leasing and BLM modifying MCC's existing federal coal leases COC-1362 and COC-67232 by adding 800 and 921 additional acres (respectively) to ensure that compliant and super-compliant coal reserves are recovered and not bypassed, and to identify stipulations for the protection of non-mineral (i.e. surface) resources.

The proposed lease modifications are located in Gunnison County, Colorado as described in Chapter 1, Background of these Lease Modifications. See Figure 2.1a.

Figure 2.1a. Vicinity Map.

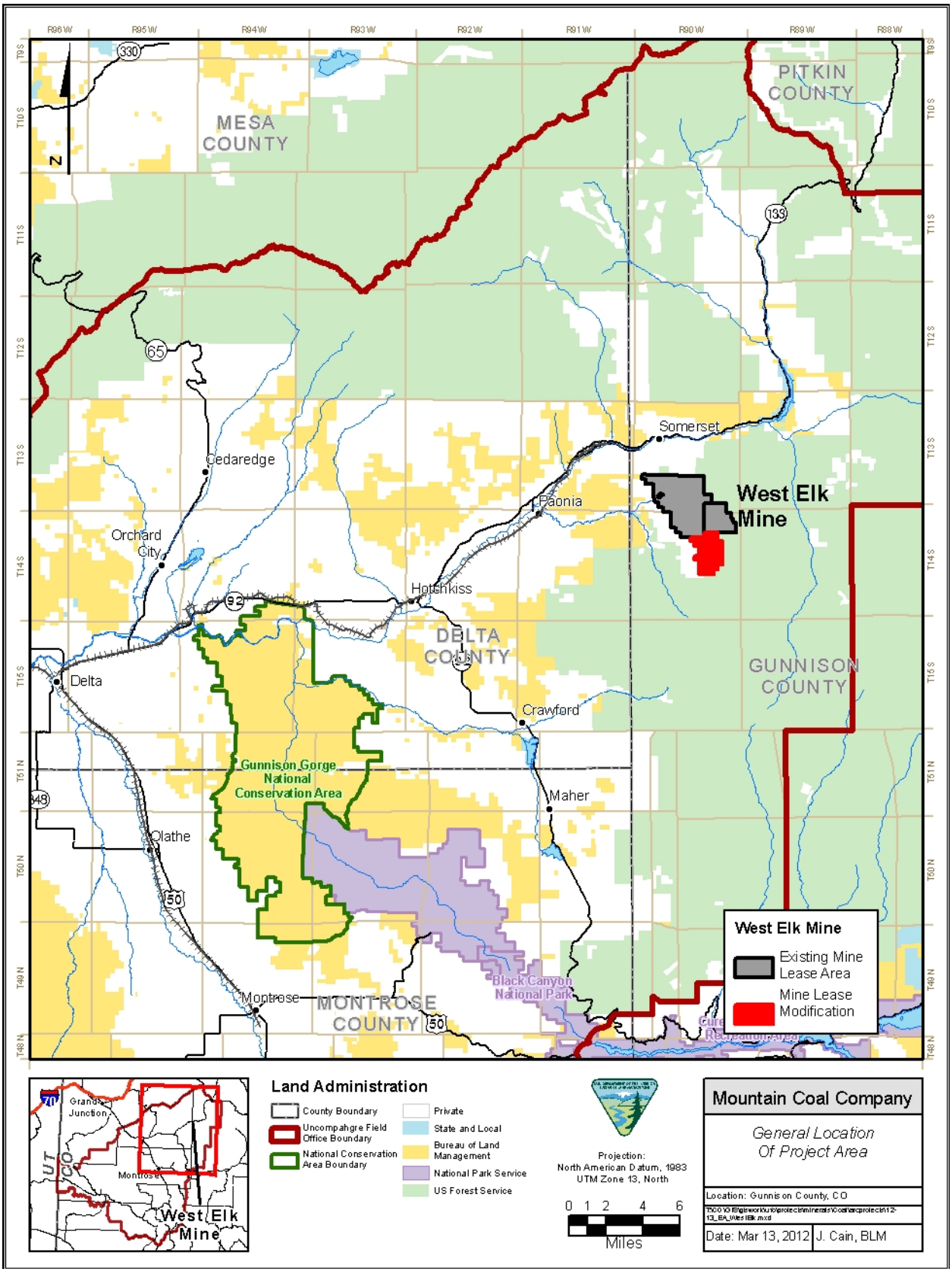
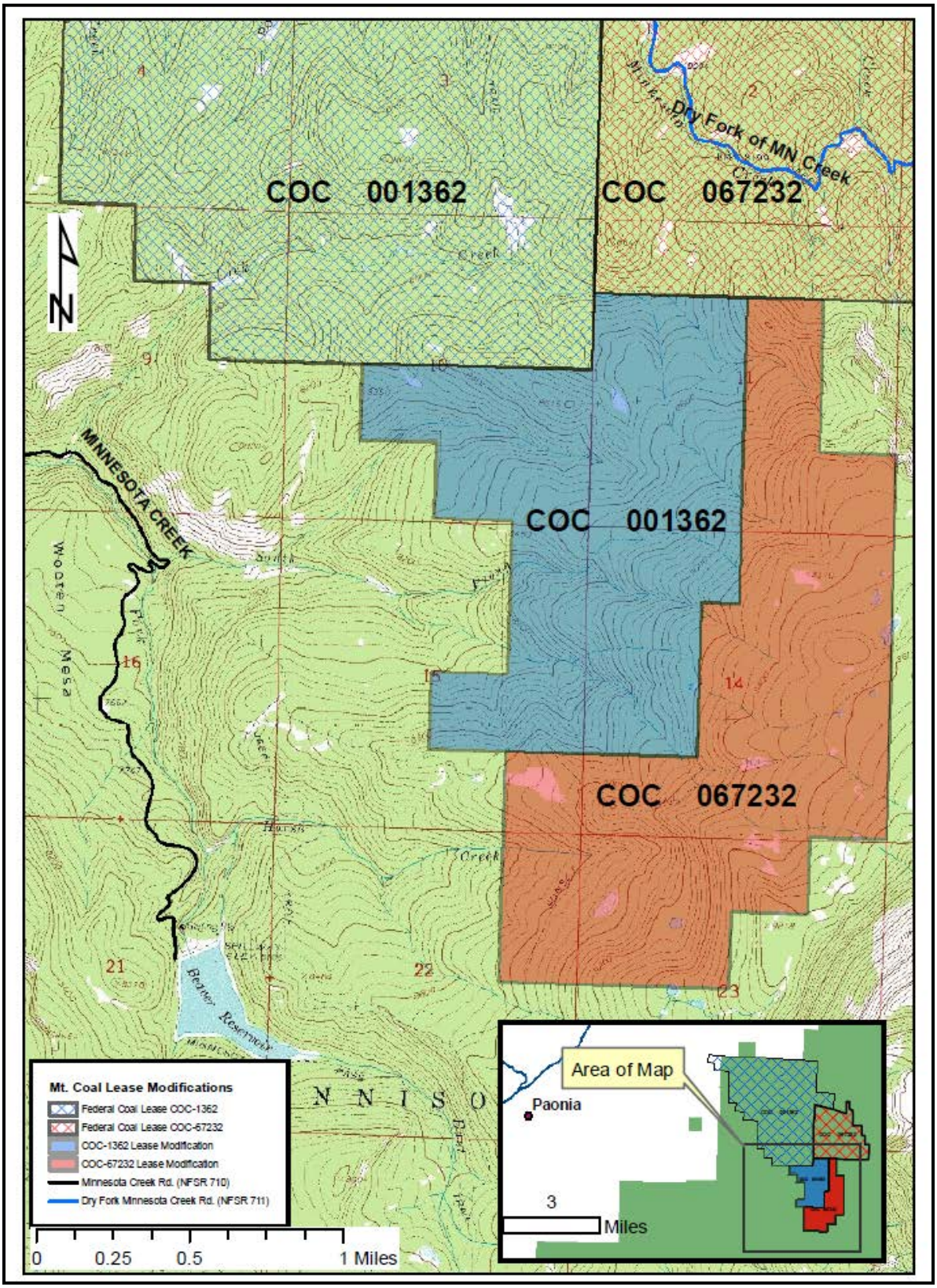


Figure 2.1b. Proposed Lease Modifications.



Stipulations for Alternatives 2 & 3

As part of the Proposed Action alternatives the GMUG Forest Supervisor must decide if the existing stipulations on the existing parent leases are sufficient for the protection of non-mineral (i.e. surface) resources. If not, additional stipulations that would provide for the protection of non-mineral resources must be prescribed. The table below shows the stipulations on the parent leases, and their applicability to the lease modifications, as well as, proposed modifications and changes.

In accordance with Forest Service Manual (FSM) 2820, the Standard Notice for Lands under the Jurisdiction of Agriculture is part of the parent leases, and hence would apply to the lease modifications. This Standard Notice includes requirements for Cultural and Paleontological Resources, and Threatened and Endangered Species (see Table 2.1a). Further, the Standard Notice contains the following language: "The permittee/lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System (NFS) when not inconsistent with the rights granted by the Secretary of Interior in the permit. The Secretary of Agriculture's rules and regulations must be complied with for (1) all use and occupancy of the NFS prior to approval of an exploration plan by the Secretary of the Interior, (2) uses of all existing improvements, such as forest development roads, within and outside the area permitted by the Secretary of the Interior, and (3) use and occupancy of the NFS not authorized by the permit/operation approved by the Secretary of the Interior."

Table 2.1a. Stipulations for Protection of Non-Mineral (Surface) Resources.

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
Cultural and Paleontological Resources	The FS is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the FS, shall: • Contact the FS to determine if a site specific cultural resource inventory is required. If a survey is required then: • Engage the services of a cultural resource specialist acceptable to the FS to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the area of proposed disturbance to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the FS for review and approval at the time a surface disturbing plan of operation is submitted. • Implement mitigation measures required by the FS and BLM to preserve or avoid destruction of cultural resource values. Mitigation may include relocation of proposed facilities,	The FS is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the FS, shall: • Contact the FS to determine if a site specific cultural resource inventory is required. If a survey is required then: • Engage the services of a cultural resource specialist acceptable to the FS to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the area of proposed disturbance to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the FS for review and approval at the time a surface disturbing plan of operation is submitted. • Implement mitigation measures required by the FS and BLM to preserve or avoid destruction of cultural resource values. Mitigation may include relocation of proposed facilities,	Use language from parent leases (required Standard Notice for Lands under the Jurisdiction of the Department of Agriculture.)

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
	testing, salvage, and recordation or other protective measures. All costs of the inventory and mitigation will be borne by the lessee or operator, and all data and materials salvaged will remain under the jurisdiction of the U.S. Government as appropriate. • The lessee or operator shall immediately bring to the attention of the FS and BLM any cultural or paleontological resources or any other objects of scientific interest discovered as a result of surface operations under this license, and shall leave such discoveries intact until directed to proceed by FS and BLM.	testing, salvage, and recordation or other protective measures. All costs of the inventory and mitigation will be borne by the lessee or operator, and all data and materials salvaged will remain under the jurisdiction of the U.S. Government as appropriate. • The lessee or operator shall immediately bring to the attention of the FS and BLM any cultural or paleontological resources or any other objects of scientific interest discovered as a result of surface operations under this license, and shall leave such discoveries intact until directed to proceed by FS and BLM.	
Endangered or Threatened Species	The FS is responsible for assuring that the leased land is examined prior to undertaking any surface-disturbing activities to determine effects upon any plant or animal species listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species Act of 1973 by detrimentally affecting endangered or threatened species or their habitats. The lessee/operator may, unless notified by the FS that the examination is not necessary, conduct the examination on	The FS is responsible for assuring that the leased land is examined prior to undertaking any surface-disturbing activities to determine effects upon any plant or animal species listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species Act of 1973 by detrimentally affecting endangered or threatened species or their habitats. The lessee/operator may, unless notified by the FS that the examination is not necessary, conduct the examination on	Use language from parent leases, required Standard Notice for Lands under the Jurisdiction of the Department of Agriculture.

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
	the leased lands at his discretion and cost. This examination must be done by or under the supervision of a qualified resource specialist approved by the FS. An acceptable report must be provided to the FS identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.	the leased lands at his discretion and cost. This examination must be done by or under the supervision of a qualified resource specialist approved by the FS. An acceptable report must be provided to the FS identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.	
	If there is reason to believe that Forest Service Sensitive species, Threatened or Endangered species of plants or animals, or migratory bird species of high Federal interest are present, or become present in the lease area, the Lessee/Operator shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted. The inventory shall include species or groups of species identified by the FS, and will be conducted to by a qualified specialist. A report of findings will be prepared and provided to the FS. A plan will be made that recommends protection for these species or action necessary to mitigate the disturbance consistent with the Forest Plan. The cost of conducting such inventory, preparing reports and carrying out mitigation measures shall be borne by the Lessee/Operator.	If there is reason to believe that Sensitive, Threatened or Endangered species of plants or animals, or migratory bird species of high Federal interest are present, or become present in the lease area, the Lessee/Operator shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted. The inventory shall be conducted by a qualified specialist, and a report of findings prepared. A plan will be made that recommends protection for these species or action necessary to mitigate the disturbance. The cost of conducting such inventory, preparing reports and carrying out mitigation measures shall be borne by the Lessee/Operator.	Use language from parent leases, required Standard Notice for Lands under the Jurisdiction of the Department of Agriculture.
Canada Lynx	To comply with the USDA Forest Service Conservation Agreement with Fish and Wildlife Service, to follow the conservation measures in the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000), the following special constraints will apply if	To comply with the Canada Lynx Assessment and Strategy (Ruediger *et al.* 2000), the following special constraints will apply if post-lease surface use is proposed in lynx habitat: • Winter access will be limited to	To comply with the GMUG Forest Plan 2008 amendment, the following special constraints will apply if surface use on the lease is proposed in lynx habitat: • Winter access will be limited

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
	surface use on the lease is proposed in lynx habitat: • Winter access will be limited to designated routes. • Further, should surface disturbing operations be proposed on the lease in lynx habitat, the following special constraints may apply, depending on site-specific circumstances: • Remote monitoring of the development sites and facilities may be required to reduce snow compaction. • A reclamation plan (e.g. road reclamation and vegetation rehabilitation) for sites and facilities that promotes the restoration of lynx habitat may be required. • Public motorized use on new roads constructed for project-specific purposes will be restricted. • Access roads will be designed to provide for effective closures and will be reclaimed or decommissioned at project completion if they are no longer needed for other management objectives. • New permanent roads will not be built on ridge tops or in saddles, or in areas identified as important for lynx habitat connectivity. New roads will be situated away from forested stringers.	designated routes. Further, should post-lease operations be proposed on the lease in lynx habitat, the following special constraints may apply, depending on site-specific circumstances: • Remote monitoring of the development sites and facilities may be required to reduce snow compaction. • A reclamation plan (e.g. road reclamation and vegetation rehabilitation) for sites and facilities that promotes the restoration of lynx habitat may be required. • Public motorized use on new roads constructed for project-specific purposes will be restricted. • Access roads will be designed to provide for effective closures and will be reclaimed or decommissioned at project completion if they are no longer needed for other management objectives. • New permanent roads will not be built on ridge tops or in saddles, or in areas identified as important for lynx habitat connectivity. New roads will be situated away from forested stringers. • If post lease surface use occurs in lynx habitat, the Lessee will be required to submit an annual report to the USDA-FS and	to designated routes. Further, should surface disturbing operations be proposed on the lease in lynx habitat, the following special constraints will apply: • Remote monitoring of the development sites and facilities will be required to reduce snow compaction. • A reclamation plan (e.g. road reclamation and vegetation rehabilitation) for sites and facilities that promotes the restoration of lynx habitat will be required. • Public motorized use on new roads constructed for project-specific purposes will be restricted. • Access roads will be designed to provide for effective closures and will be reclaimed or decommissioned at project completion if they are no longer needed for other management objectives. • New permanent roads will not be built on ridge tops or in saddles**,** if possible, or in areas identified as important for lynx habitat connectivity. New roads will be situated away from forested stringers, if possible.

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
		USFWS of all activities having occurred in lynx habitat.	
Raptors	For raptors (except American kestrel) the Lessee will be required to: • Conduct surveys for nesting raptors on the lease prior to development of any surface facilities, and • No surface activities will be allowed within ¼ mile radius of active nest sites between the dates of February 1 and August 15, unless authorized by the Forest Service on a site-specific basis. • No surface activities will be allowed within 1-mile radius of active bald eagle or peregrine falcon nest sites between the dates of February 1 and August 15, unless authorized by the Forest Service on a site-specific basis.	For raptors (except American kestrel) the Lessee will be required to: • Conduct surveys for nesting raptors on the lease prior to development of any surface facilities, and • No surface activities will be allowed within ½-mile radius of active nest sites between the dates of February 1 and August 15, unless authorized by the Forest Service on a site-specific basis.	Use combined language from COC-67232 and COC-1362 which reflects Forest Plan standards as well as guidelines from the Biological Evaluation for this project: • Conduct surveys for nesting raptors on the lease prior to development of any surface facilities, and • No surface activities will be allowed within ½-mile radius of active nest sites between the dates of February 1 and August 15, unless authorized by the Forest Service on a site-specific basis. • No surface activities will be allowed within 1-mile radius of active bald eagle or peregrine falcon nest sites * between the dates of February 1 and August 15, unless authorized by the Forest Service on a site-specific basis. (* No bald eagle or peregrine falcon nest site habitat has been identified within the lease modifications as indicated in the Biological Evaluation prepared for this analysis.)
Big game winter range	In order to protect big game wintering areas, elk calving areas, and other key wildlife habitat and/or activities, specific surface use may be curtailed during specific times of year. Specific time	In order to protect big game wintering areas, elk calving areas, and other key wildlife habitat and/or activities, specific surface use may be curtailed during specific times of year. Specific time	Use language from parent leases

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
	restrictions for specific species will be evaluated by the Forest Service at the individual project stage, and any additional site specific conditions of use developed at that time.	restrictions for specific species will be evaluated by the Forest Service at the individual project stage, and any additional site specific conditions of use developed at that time.	
Water depletions	In the future, if water to be used for mine related activities is taken from a source that is not considered to be non-tributary waters by the U.S. Fish and Wildlife Service, or which exceeds a depletion amount previously consulted upon, the permitting agency must enter into consultation with the U.S. Fish and Wildlife Service to determine appropriate conservation measures to offset effects to listed fish and critical habitat in the upper Colorado River Basin.	In the future, if water to be used for mine related activities is taken from a source that is not considered to be non-tributary waters by the U.S. Fish and Wildlife Service, or which exceeds a depletion amount previously consulted upon, the permitting agency must enter into consultation with the U.S. Fish and Wildlife Service to determine appropriate conservation measures to offset effects to listed fish and critical habitat in the upper Colorado River Basin.	Use language from parent leases
Breeding birds	If surface disturbance is proposed on the lease, the lessee/operators will be required to conduct breeding bird surveys prior to surface disturbance as prescribed by the Forest Service.	If surface disturbance is proposed on the lease, the lessee/operators will be required to conduct breeding bird surveys prior to surface disturbance.	Use language from COC-1362 parent lease.
Geologic hazards	No surface occupancy would be allowed in areas of high geologic hazard or high erosion potential, or on slopes which exceed 60%.	No surface occupancy would be allowed in areas of high geologic hazard or high erosion potential.	Use language from parent leases.
	Special interdisciplinary team analysis and mitigation plans detailing construction and mitigation techniques would be required on areas where slopes range from 40-60 percent. The interdisciplinary team could include engineers, soil scientist, hydrologist, landscape architect, reclamation specialist and mining engineer.	Special interdisciplinary team analysis and mitigation plans detailing construction and mitigation techniques would be required on areas where slopes range from 40-60 percent. The interdisciplinary team could include engineers, soil scientist, hydrologist, landscape architect, reclamation specialist and mining engineer.	Use language from parent leases.

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
Baseline Information	The operator/lessee would be required to perform adequate baseline studies to quantify existing surface and subsurface resources. Existing data can be used for baseline analyses provided that the data is adequate to locate, quantify, and demonstrate interrelationships between geology, topography, hydrogeology, and hydrology. Baseline studies are critical to the success of future observation and assessment of mining related effects on resources.	The operator/lessee would be required to perform adequate baseline studies to quantify existing surface and subsurface resources. Existing data can be used for baseline analyses provided that the data is adequate to locate, quantify, and demonstrate interrelationships between geology, topography, hydrogeology, and hydrology. Baseline studies are critical to the success of future observation and assessment of mining related effects on resources in the Dry Fork lease tract.	Use language from parent leases
Monitoring Program	The operator/lessee would be required to establish or amend a monitoring program to be used as a continuing record of change over time of area resources in order to assess mining induced impacts. The monitoring program shall provide the procedures and methodologies to adequately assess interrelationships between geology, topography, hydrogeology, and hydrology identified in the baseline assessment to mining activities on the lease area. The monitoring program shall incorporate baseline data so as to provide a continuing record over time.	The operator/lessee of the lease tract would be required to establish or amend a monitoring program to be used as a continuing record of change over time of area resources in order to assess mining induced impacts. The monitoring program shall provide the procedures and methodologies to adequately assess interrelationships between geology, topography, hydrogeology, and hydrology identified in the baseline assessment to mining activities in the lease tract area. The monitoring program shall incorporate baseline data so as to provide a continuing record over time.	Use language from parent leases
Riparian, wetland or floodplain	Surface use or disturbances (except for surface subsidence and resource monitoring purposes defined in the approved mining permit) will avoid riparian, wetland or floodplain areas, and a buffer zone surrounding these areas (the definition of riparian areas and appropriate buffer zone will be consistent with that defined in the	Surface use or disturbances (except for surface subsidence and resource monitoring purposes defined in the approved mining permit) will not be permitted in riparian, wetland or floodplain areas, or within a buffer zone surrounding these areas (the definition of riparian areas and appropriate buffer zone will be consistent with that	Use language from parent leases

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
	Forest Service Manual and Water Conservation Practices Handbook. Wetland definition will follow Army Corps of Engineers guidelines) unless no practical alternatives exist.	defined in the Forest Service Manual and Water Conservation Practices Handbook. Wetland definition will follow Army Corps of Engineers guidelines) unless no practical alternatives exist.	
Subsidence	If subsidence adversely affects surface resources in any way (including, but not limited to a documented water loss), the Lessee, at their expense will be responsible to: restore stream channels, stock ponds, protect stream flow with earthwork or temporary culverts, restore affected roads, or provide other measures to repair damage or replace any surface water and/or developed ground water source, stock pond, water conveyance facilities, with water from an alternate source in sufficient quantity and quality to maintain existing riparian habitat, livestock and wildlife use, or other land uses as authorized by 36 CFR 251.	If subsidence adversely affects surface resources in any way (including, but not limited to a documented water loss), the Lessee, at their expense will be responsible to: restore stream channels, stock ponds, protect stream flow with earthwork or temporary culverts, restore affected roads, or provide other measures to repair damage or replace any surface water and/or developed ground water source, stock pond, water conveyance facilities, with water from an alternate source in sufficient quantity and quality to maintain existing riparian habitat, livestock and wildlife use, or other land uses as authorized by 36 CFR 251.	Use language from parent leases
	The Lessee/Operator shall be responsible for monitoring, repairing and/or mitigating subsidence effects on existing facilities under Special Use Permit with the Forest Service. Monitoring, repair and/or mitigation, if needed, would be performed at the Lessee's expense. These requirements will be coordinated with the District Ranger and the Special Use Permittee.	The Lessee/Operator shall be required to perform the following with respect to monitoring, repairing and/or mitigating subsidence effects on existing facilities under Special Use Permit with the Forest Service. Monitoring, repair and/or mitigation will be performed at the Lessee's expense. The Lessee may request variations on timing for surveys, monitoring and reporting. Approving such requests would be at the discretion of the District Ranger. a. Baseline condition surveys of existing facilities will be completed the Fall following award of lease. Reports of this	As parent lease for COC-67232 deals specifically with an irrigation ditch on that lease, use language from COC-1362 on lease modifications.

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
		survey will be deliverable to the Forest Service by December 1 of that same year. b. In consultation with the Special Use Permittee and the Forest Service, install equipment to monitor flow on water conveyance facilities during the Fall following award of lease. Flow monitoring shall commence the following spring and continue until one year post mining. Flow data shall be provided to the Forest Service annually by December 1. c. A Surface Facility Monitoring and Mitigation Plan (Plan) will be submitted to the Forest Service for review and approval not later than 12 months prior to scheduled undermining. The Plan will detail measures to be taken to monitor, repair and mitigate subsidence effects of the facilities during actual mining and for one year.	
Roadless	The permittee/lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System (NFS) when not inconsistent with the rights granted by the Secretary of Interior in the permit. The Secretary of Agriculture's rules and regulations must be complied with for (1) all use and occupancy of the NFS prior to approval of an exploration plan by the Secretary of the Interior, (2) uses of all existing improvements, such as forest development roads, within and outside the area permitted by the Secretary of the Interior, and (3) use and occupancy	All or parts of the following lands encompassed in this lease are in the West Elk Inventoried Roadless Area and may be subject to restrictions on road-building pursuant to rules and regulations of the Secretary of Agriculture applicable at the time any roads may be proposed on the lease. All or parts of the following lands encompassed in this lease are in the West Elk Inventoried Roadless Area and may be subject to restrictions on road-building pursuant to rules and regulations of the Secretary of Agriculture applicable at the time any roads may be proposed on the lease.	Include a lease notice that reflects the recent court rulings in the 2001 Rule and would allow for any potential future changes if the Colorado Rule is in effect. This lease notice would state: All or parts of the following lands encompassed in this lease are in an Inventoried Roadless Area and will be subject to all existing and future rules and regulations of the Secretary of Agriculture concerning management of roadless areas including restrictions on road-building.

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
	of the NFS not authorized by the permit/operation approved by the Secretary of the Interior. Federal Coal Lease C-1362, as modified October 2001 All or parts of the following lands encompassed in this lease are in the West Elk Inventoried Roadless Area and may be subject to restrictions on road-building pursuant to rules and regulations of the Secretary of Agriculture applicable at the time any roads may be proposed on the lease. Legal descriptions are approximate. Locations of any proposed surface use would be verified for relationship to IRA boundaries using site-specific maps if/when surface operations are proposed.		.
Air Quality	n/a	n/a	Mitigation measures and emissions controls would be implemented in order to reduce particulate matter/fugitive dust emissions during construction and ongoing production activities. Fugitive emissions from all vehicles traveling on non-paved surfaces during all project phases would be controlled using appropriate dust suppression measures applied to the non-paved roads. Storage piles would be watered as necessary in order to limit wind erosion potential and to reduce fugitive emissions. Most coal transfer points and processing activities during coal production would be enclosed, thereby limiting fugitive particulate

Resource Area	Stipulations Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Stipulations Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Stipulations Specific to Lease Modifications
			matter emissions. Potential mitigation measures designed to decrease project impacts to global warming during construction could include: ▪ use of alternative fuel construction equipment; ▪ use of local building materials; and ▪ recycling of demolished construction material. With regard to production activities at the mine, methane liberation from the mine may be reduced through mine planning, sealing previously mined areas, and degasification efforts. Methane drainage systems, consisting of vertical and horizontal boreholes could reduce methane gas emissions from the unmined reserve. This can reduce mine ventilation emissions when the coal is mined; however, in many cases the emissions are vented. Degasification procedures can only be developed as experience is gained during future mining.
Visuals	n/a	n/a	Within the lease modification area, the lessee will work with the District Ranger and his/her representative to see that all mine operations are situated on the ground in such a manner that reasonably minimizes impacts to the scenic integrity of that landscape as prescribed in the Forest Plan.

The parent leases also contain lease terms from BLM regarding coal mine methane. These are addressed as a lease addendum as described in Table 2.1b.

Table 2.1b. BLM-specific Lease Addendums for Protection of Non-Mineral (Surface) Resources.

Resource Area	Addendum Carried Forward from Parent Lease COC-1362 Specific to Forest Service Lands	Addendum Carried Forward from Parent Lease COC-67232 Specific to Forest Service Lands	Addendum Specific to Lease Modifications
Methane Flaring, Capture/Use or other alternatives to venting	Sec. 3. Notwithstanding the language in Sec.2 of this lease and subject to the terms and conditions below, lessee is authorized to drill for, extract, remove, develop, produce and capture for use or sale any or all of the coal mine methane from the above described lands that it would otherwise be required to vent or discharge for safety purposes by applicable laws and regulations. For purposes of this lease, "coal mine methane" means any combustible gas located in, over, under, or adjacent to the coal resources subject to this lease, that will or may infiltrate underground mining operations. Sec. 4. Notwithstanding any other provision of this lease, nothing herein shall, nor shall it be interpreted to, waive, alter or amend lessee's right to vent, discharge or otherwise dispose of coal mine methane as necessary for mine safety or to mine the coal deposits consistent with permitted underground mining operations and federal and state law and regulation. Lessee shall not be obligated or required to capture for use or sale coal mine methane that would otherwise be vented or discharged if the capture of coal mine methane, independent of activities related to mining coal, is not economically feasible or if the coal mine methane	Sec. 3. Notwithstanding the language in Sec.2 of this lease and subject to the terms and conditions below, lessee is authorized to drill for, extract, remove, develop, produce and capture for use or sale any or all of the coal mine methane from the above described lands that it would otherwise be required to vent or discharge for safety purposes by applicable laws and regulations. For purposes of this lease, "coal mine methane" means any combustible gas located in, over, under, or adjacent to the coal resources subject to this lease, that will or may infiltrate underground mining operations. Sec. 4. Notwithstanding any other provision of this lease, nothing herein shall, nor shall it be interpreted to, waive, alter or amend lessee's right to vent, discharge or otherwise dispose of coal mine methane as necessary for mine safety or to mine the coal deposits consistent with permitted underground mining operations and federal and state law and regulation. Lessee shall not be obligated or required to capture for use or sale coal mine methane that would otherwise be vented or discharged if the capture of coal mine methane, independent of activities related to mining coal, is not economically feasible or if the coal mine methane	This lease addendum has been developed in response to direction from the Secretary of Interior, and is a negotiated addendum between the Department of Interior (BLM) and the lessee. Use language from parent leases. **It is recommended that these lease addenda be renegotiated with Lessee to allow flexibility for mitigations otherwise required by law, regulation or permit.**

must be vented in order to abate the potential hazard to the health or safety of the coal miners or coal mining activities. In the event of a dispute between lessor and lessee as to the economic or other feasibility of capturing for use or sale the coal mine methane, lessor's remedy as a prevailing party shall be limited to recovery of the compensatory royalties on coal mine methane not captured for use or sale by lessee. Lessee shall have the right to continue all mining activities under the lease, including venting coal mine methane, pending resolution of any dispute regarding the application of the terms of Sections 3 and 4.

Sec. 2 (c) COAL MINE METHANE OPERATIONS AND ROYALTIES- Notwithstanding the language in Part II, Section 2 (a) of this lease, the royalty shall be 12.5 percent of the value of any coal mine methane that is captured for use or sale from this lease. For purposes of this lease, the term "capture for use or sale" shall not include and the royalty shall not apply to coal mine methane that is vented or discharged and not captured for the economic or safety reasons described in Part I, Section 4 of this lease. Lessee shall have no obligation to pay royalties on any coal mine methane that is used on or for the benefit of mineral extraction at the West Elk coal mine. When not inconsistent with any express provision of this lease, the lease is subject to all rules and regulations related to Federal gas royalty collection in Title 30 of the Code of Federal Regulations now or hereinafter in effect and lessor's rules and regulations related to applicable

must be vented in order to abate the potential hazard to the health or safety of the coal miners or coal mining activities. In the event of a dispute between lessor and lessee as to the economic or other feasibility of capturing for use or sale the coal mine methane, lessor's remedy as a prevailing party shall be limited to recovery of the compensatory royalties on coal mine methane not captured for use or sale by lessee. Lessee shall have the right to continue all mining activities under the lease, including venting coal mine methane, pending resolution of any dispute regarding the application of the terms of Sections 3 and 4.

Sec. 2 (c) COAL MINE METHANE OPERATIONS AND ROYALTIES- Notwithstanding the language in Part II, Section 2 (a) of this lease, the royalty shall be 12.5 percent of the value of any coal mine methane that is captured for use or sale from this lease. For purposes of this lease, the term "capture for use or sale" shall not include and the royalty shall not apply to coal mine methane that is vented or discharged and not captured for the economic or safety reasons described in Part I, Section 4 of this lease. Lessee shall have no obligation to pay royalties on any coal mine methane that is used on or for the benefit of mineral extraction at the West Elk coal mine. When not inconsistent with any express provision of this lease, the lease is subject to all rules and regulations related to Federal gas royalty collection in Title 30 of the Code of Federal Regulations now or hereinafter in effect and lessor's rules and regulations related to applicable

reporting and gas measurement now or hereinafter in effect	reporting and gas measurement now or hereinafter in effect
SEVERABILITY- In the event any provision of this addendum is subject to a legal challenge or is held to be invalid, unenforceable or illegal in any respect, the validity, legality and enforceability of this lease will not in any way be affected or impaired thereby and lessee will retain, in accordance with the terms of this lease, the exclusive right and privilege to drill for, mine, extract, remove or otherwise process and dispose of the coal deposits ,upon, or under the lands described in this lease, including the right to vent or discharge coal mine methane for safety purposed as required by applicable laws and regulation.	SEVERABILITY- In the event any provision of this addendum is subject to a legal challenge or is held to be invalid, unenforceable or illegal in any respect, the validity, legality and enforceability of this lease will not in any way be affected or impaired thereby and lessee will retain, in accordance with the terms of this lease, the exclusive right and privilege to drill for, mine, extract, remove or otherwise process and dispose of the coal deposits ,upon, or under the lands described in this lease, including the right to vent or discharge coal mine methane for safety purposed as required by applicable laws and regulation.

Specific to Alternative 2 -Consent and Lease under the 2001 Roadless Area Conservation Rule Framework (Proposed Action)

At the time the DEIS is being prepared, this rule is in effect in Colorado. This is not the Agencies' Preferred Alternative because post-lease surface-disturbing activities (roads) technologically and economically necessary for safe mining underground currently cannot be authorized under it.

Framework of the 2001 Roadless Conservation Rule

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations/notices/addendums in Tables 2.1a and 2.1b above. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. Because a leasing decision itself does not involve any mineral development or surface disturbance, it is necessary to project the amount of surface use or activity that will likely result during lease development in order to disclose potential effects and inform decision-making. The Reasonably Foreseeable Mine Plan (RFMP), which describes the likely post-lease activity for this alternative is described in Section 3.2.

Specific to Alternative 3- Consent and Lease under the proposed Colorado Roadless Rule Framework

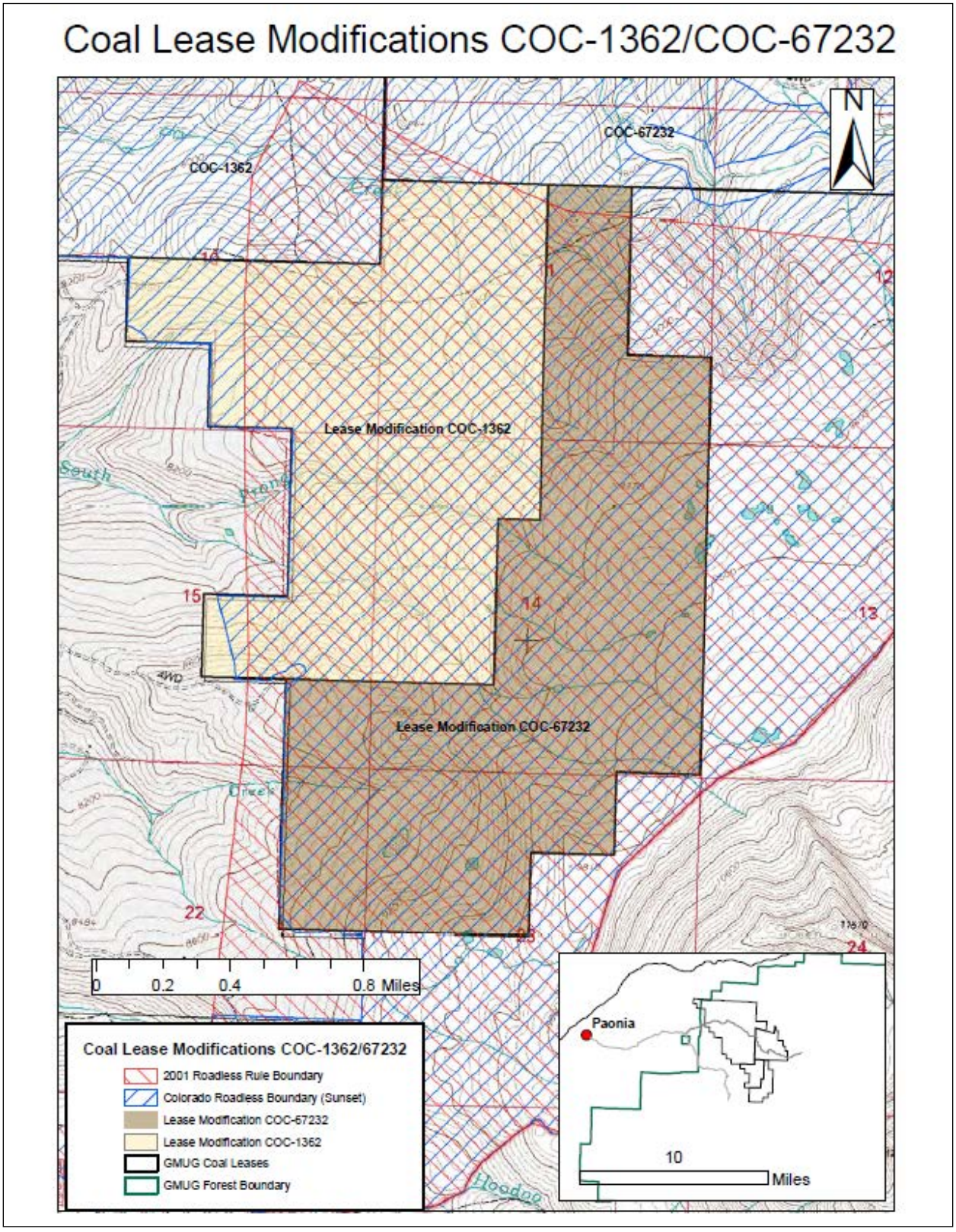
Alternative 3 is similar to Alternative 2 except that it would be analyzed under the framework of the Colorado Roadless Rule. At the time this DEIS is being prepared, this rule is not yet in effect, so while this may be the Agencies' Preferred Alternative, post-lease surface-disturbing activities could not currently be authorized under it.

Framework of the Colorado Roadless Rule

Under Alternative 3, the Forest Service would consent to leasing and BLM would modify the leases with all stipulations/notices/addendums in Tables 2.1a and 2.1b above. Under the Colorado Roadless Rule, post-lease temporary road building could be permitted in the lease modifications because it is in the area known as the "North Fork Coal Mining Area" in the Rule. This would allow for MDW drilling, and would therefore allow for mining the coal under RFMP (described in Section 3.2). Because a leasing decision itself does not involve any mineral development or surface disturbance, it is necessary to project the amount of surface use or activity that will likely result during lease development in order to disclose potential effects and inform decision-making. The Reasonably Foreseeable Mine Plan (RFMP), which describes the likely post-lease activity for this alternative is described in Section 3.2.

Colorado Roadless boundaries vary slightly from the 2001 Roadless Area boundaries as displayed in Figure 2.1b below.

Figure 2.1b. Lease Modifications with Roadless Boundaries.



Other Actions/Permits/Plans may be required

Appendix D details roles, other actions and permits that may be required to mine the lease modifications. At time of DEIS preparation, this list is also being reviewed by DRMS to include those additional permits that would be required to be obtained by MCC for regulatory DRMS's purposes.

2.2 Alternatives Considered but Eliminated from Detailed Study_

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). A number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Lease modifications as applied for by ArkLand Company/MCC

ArkLand Company (parent company of MCC) requested to modify existing Federal coal leases at the West Elk Mine. The action, as proposed, is to add approximately 800 acres to lease COC-1362 and approximately 921 acres to lease COC-67232 for a total of approximately 1,721 acres. Associated methane drainage well installation, and the future foreseeable land disturbance includes an additional 72 acres (approximately) of disturbance for 48 additional methane drainage wells and access routes. This alternative is similar to Alternatives 2 & 3; however it does not specifically include stipulations that are necessary for the protection of surface resources. While analysis of this alternative is required by BLM's leasing regulations (43 CFR 3400), BLM's regulations could be interpreted in two ways as it applies to a lease modification because 1) inclusion of the stipulations on the parent leases is implied since the stipulations automatically apply to the added lands (the same as those are already included in Alternatives 2 & 3) or 2) they are applying for the modification without stipulations which is inconsistent with the terms of parent leases and would remove surface protections already in place (43 CFR 3432.3) on parent leases if selected. Therefore, because of its inconsistency with the stipulations already deemed necessary on the parent leases, this alternative is not considered in detail.

Reduce the potential greenhouse gas emissions of the project through methane flaring, methane capture, or through the use of ventilation air methane (VAM).

Several different scenarios were evaluated for capturing and using methane. The analysis looked at different drilling strategies for venting methane and strategies to use or flare the methane. The analysis evaluated the more concentrated methane vented through the drainage wells and also the less concentrated methane vented through the ventilation system (Ventilation Air Methane (VAM)). The analysis found that many of the technologies have not been successful in adequately venting methane. Similarly, the more promising technologies are not currently economically feasible and would be very difficult to implement at the West Elk mine due to site logistics and regulatory constraints. For that reason, we have not included a separate methane venting and use alternatives. Methane capture or use would be mitigation measures that are applicable to all alternatives including the no action alternative.

A lease addendum has been added to the parent leases by BLM which allows MCC to consider these methods if it is economically feasible for them to do so. Lease addendums would be carried forward to the lease modifications that permit (but do not require) these possible mitigation measures (see Table 2.1b). The addendums require MCC to prepare annual reports on the feasibility of methane capture (among other potential control options) and require that the analysis is carried out to show whether or not the mitigation measures are economically feasible and protect the health, safety, and lives of the miners.

These activities may be addressed in further detail at the permitting stage. There is no permitting proposal related to these mitigation measures in front of the agencies for consideration at this time. A site-specific analysis would not occur on these lease modifications until the reserves are under lease; however, MCC may consider these activities on any of their existing leaseholds. Any of these methods to reduce the effects of greenhouse gases on climate change may be designed by MCC and further approved by the regulatory agencies as part of the mine/ventilation plan approval process so long as the lives of miners are demonstrated to be adequately protected. Also, analysis/acceptance of these mitigations, if proposed, needs to occur based on mine safety considerations which would be addressed during the permitting process by 1) the Department of Labor, Mine

Health and Safety Administration on a case-by-case basis to ensure the safety of miners and 2) through greenhouse gases compliance with the Clean Air Act. At such a time that there is a methane mitigation proposal that is determined safe to miners by regulatory agencies, additional NEPA analysis may be required as these activities may require separate authorizations (such as a Special Use Authorization) from the surface management agencies because disturbance may not be determined incidental to (or required for) underground mining (36 CFR 761.12-13, 36 U.S.C. 1272(e)(2)(A) and 43 CFR 3461.1). Currently, there has not been a determination of applicability to a regulatory framework for this mine to require mitigation of methane. This situation is currently under review by many State and Federal Agencies and in the Courts as it applies in the broader regulatory context of greenhouse gases. The Tailoring Rule may be determined (by CDPHE) to apply to the West Elk Mine and may provide some of the additional regulatory framework necessary for methane mitigation. There may be future laws or rule making that requires mitigation of methane which the mine may be subject to in accordance with standard lease language requiring compliance with all laws and regulations.

West Elk Mine does use some methane liberated from the mine to heat air at surface openings of the mine to prevent ice build-up. This is consistent with current case law (*Vessel's* decision) as we understand it regarding methane use at coal mines. This use is not intended as mitigation for methane released (rather the mine using a byproduct of mining for mine efficiency purposes), but does also serve the purpose of reducing methane emissions slightly. This is quantified in Chapter 3 Air Quality analysis.

Mitigation of the release of methane is estimated to reduce methane emissions by an average of 87-95% depending on mitigation method. The following discussion describes the reasons using these methods are not cost effective and difficult to implement for the West Elk Mine. The following sources (among others) were consulted as they relate to the discussion below:

- http://epa.gov/cmop/docs/World-Coal-article_May2010.pdf;
- http://www.epa.gov/cmop/docs/VAM-exhaust-characterization-July2010.pdf;
- http://www.epa.gov/cmop/docs/concentrating-cmm.pdf;
- http://www.epa.gov/cmop/docs/VAM-case-study-July2010.pdf;
- http://www.epa.gov/coalbed/docs/vam-planning-mitigation.pdf;
- http://www.epa.gov/cmop/docs/cmm_conference_sep07/uk_coal_flaring.pdf;
- http://www.cdc.gov/Niosh/mining/pubs/pdfs/cmmar.pdf

Flaring & VAM

Methane (CH_4) is a greenhouse gas (GHG) that remains in the atmosphere for approximately 9 to 15 years, and is emitted from a variety of natural and human-influenced sources, including coal mining. The coal formation process causes methane to form within the coal seam, which is then held in the seam until disturbed, such as through coal mining. Coal mine methane (CMM) is the methane released from the coal and surrounding rock strata during coal mining (surface and underground) activities. In underground mines, it can create an explosive hazard to coal miners; therefore, it is removed through ventilation systems. CMM emissions in working mines arise during two stages:

Methane is released as a direct result of the physical process of coal extraction. In many underground mines, the coal is extracted through longwall mining. Longwall mining, as with other sub-surface techniques, releases methane previously trapped within the coal seam into the air supply of the mine as layers of the coal face are removed, thereby creating a potential safety hazard.

Methane is released during the collapse of the surrounding rock strata after a section of the coal seam has been mined and the artificial roof and wall supports are removed as mining progresses to another section. The debris resulting from the collapse is known as gob and also releases methane or 'gob gas' into the mine. (Sources: http://www.world coal.org/coal/coal-seam-methane/coal-mine-methane/; http://www.epa.gov/methane/index.html).

Flaring methane is an option that exists for disposing of CMM that would otherwise be released directly into the atmosphere. The flared methane is converted to carbon dioxide, heat, and water. Flaring still leads to GHG emissions in the form of carbon dioxide; however, because methane's global warming potential (GWP) is over 20 times greater than that of carbon dioxide, flaring reduces the overall greenhouse effect. (Sources: http://www.world coal.org/coal/coal-seam-methane/coal-mine-methane/; http://www.epa.gov/ methane/ index.html; http://www.epa.gov/cmop/docs/022red.pdf).

The process of flaring the CMM can result in the release of other air pollutants, including nitrogen oxides and carbon monoxide, which are criteria pollutants and regulated gases. Flaring can be performed in either open or enclosed systems, and the technique is similar to that deployed in the oil and gas industries:

- Enclosed Flaring -- An enclosed flare is a combustion device for burning gases, consisting of a burner that is mounted such that the flame is shielded or enclosed in a stack, eliminating any visible flame.
- Open Flaring -- An open flare is a combustion device for burning gases, consisting of a burner that is mounted such that the flame is "open" and is not shielded.

An alternative analyzing the flaring of CMM at the West Elk Mine was considered and eliminated from detailed analysis. This is an alternative is that is outside of scope of leasing decisions, as methane is a safety issue addressed by the Mine Health and Safety Administration (MSHA) on a case-by-case basis in order to ensure the safety of miners. In addition, GHGs and the compliance with the Clean Air Act (CAA) are regulated by the Colorado Department of Public Health and Environment (CDPHE) during the permitting process.

MSHA's purpose is to "prevent death, disease, and injury from mining and to promote safe and healthful workplaces for the Nation's miners" (source: http://www.msha.gov/MSHAINFO/MISSION.HTM). MSHA has the regulatory authority to approve proposed flaring systems intended for use at coal mines in the United States. In underground coal mining, methane is released into the mine workings during extraction. MSHA regulations require methane to be diluted in the ventilation air and then vented to the atmosphere, known as VAM, for the safety of the mine workers.

With respect to VAM, flaring does not appear to be a technologically feasible option due to the high volume of air flow and dilute concentrations of methane. Any option to control VAM through flaring would result in additional undesirable air impacts from the additional make-up fuel combustion required to fully oxidize methane within the VAM stream.

A detailed assessment of the capture and centralized collection of methane drainage well (MDW) methane was provided to BLM by MCC (*West ELK Mine E-Seam Gas Economic Evaluation*, September 29, 2009; this document contains confidential business information and is not intended for Agency dispersal). The results of that analysis, discussed below (under methane capture and VAM), are included as part of a methane flaring analysis for the MDWs. The overall assessment indicated that due to the costs for the project, additional potential environmental impacts, regulatory concerns, and safety considerations, further analysis was not warranted at this time. Flaring may reduce the global GHG burden; however, given these considerations, a flaring option is potentially the least desirable methane-control option from both and environmental and economic efficiency standpoint. In addition, flaring of methane can result in the release of other air pollutants including nitrogen oxides and carbon monoxide, which are criteria pollutant and regulated gases.

Regardless of the technical and economic feasibility of mitigation, the use of flaring to reduce the effects of GHG on climate change would have to be approved by MSHA, which has the regulatory authority to approve proposed flaring systems intended for use at coal mines in the U.S. MSHA would need to conduct a thorough review of the proposed flaring system in order to establish the requirements for the system at this mine. Currently, there are no flaring operations or proposed test operations in the United States in active gob areas of a coal mine, but this technology is being considered at the Solvay trona mine in Wyoming and the results may be transferrable to underground coal mining. It is not likely that a thorough review, and an approval, would occur prior to the development and operation of the coal mine lease expansion. If flaring were to be approved, an environmental review would be addressed in a modification to the mine plan.

Lease addendums have been added to the parent leases, in the form of stipulations that would be carried forward to the lease modifications that address this possible mitigation measure. The stipulations require the lessee to prepare annual reports on the feasibility of flaring (among other potential control options) CMM. The stipulation requires that the analysis is carried out in order to show whether or not the mitigation alternative is economically feasible and protective to the health, safety, and lives of the miners.

Methane Capture & VAM

In the geological process, methane and coal are formed together. In many coal-bearing formations, the methane can be trapped within the coal seams and/or within the surrounding rock strata. The process of longwall mining reduces the geological pressure and fractures the coal, thereby releasing the methane. In underground coal mining, methane is released into the mine during extraction. MSHA regulations require methane to be diluted in the ventilation air and then vented to the atmosphere, known as VAM, for the safety of the mine workers.

With respect to the VAM, no technology currently exists that has been demonstrated to have the capability of handling the volume of ventilation air and dilute concentrations of methane at the West Elk Mine to make capture economically feasible. In 2009, the DOE released the results of a study to simulate VAM capture using a non-

producing mine (see U.S. Department of Energy Cooperative Agreement DE-FC26-02NT41620, available on the Internet at: http://www.epa.gov/cmop/ docs/vam_executive-summary.pdf). The project demonstrated continued advancements and a viable solution for coal mine VAM control. The DOE, however, stated that the, "system is only economically feasible when there is value for GHG emission reduction." This implies carbon credits, cap-and-trade, or another market or regulatory-based incentivized system for reducing GHGs. (The DOE assessment included carbon credits in their economic feasibility model, which provided a cost basis for controlling VAM up to 180k cfm.)

In relation to the coal lease modifications, MCC commissioned an analysis (*West ELK Mine E-Seam Gas Economic Evaluation*, September 29, 2009; this document contains confidential business information and is not intended for Agency dispersal) for capturing and/or conditioning the MDW methane for use onsite as fuel for a co-generation facility in order to produce electricity for sale to the grid, or for sale as pipeline quality natural gas. The study evaluated the gas characteristics and potential quantities of methane that would be realistically produced based upon existing well data and testing. This information was then used to engineer a collections system, including options for pipelines and screw compressor configurations for pressure management; and dehydration units, control systems, values, and metering. Options for energy generation equipment included reciprocating internal combustion engines (RICE) and combustion turbines. Additional gas processing equipment options for rendering natural gas from the CMM were also presented. The analysis covered multiple scenarios for multiple configurations of equipment.

For energy production, the RICE proved to be the closest potential candidate for any onsite energy production. The analysis for the production of natural gas from CMM indicated that the levels of contaminants in the gas (including carbon dioxide, oxygen, and nitrogen) were treatable, but that the cost of treatment of the gas, the cost of gas compression, and the distance to access available existing pipeline systems were prohibitive for delivery of the gas as a saleable product. This mining project would be an addition to an existing mine; therefore, uninterrupted mining would need to take place in order for this project to be economically viable.

An alternative for methane capture, with the required infrastructure, would likely include more miles of road construction connecting to a capture facility (probably centralized to operations) and pipeline construction (even though pipelines may occur near or in roads) and surface disturbance than would the Alternatives 2 or 3, which would also produce additional impacts across multiple resource areas including air resources and roadless areas.

The level of analysis, as summarized above, provided the agencies with adequate information to determine that an alternative analyzing CMM capture is not possible at this time. The alternative was eliminated from detailed analysis due to the potential environmental impacts associated with methane capture, potential regulatory burdens, the overall costs of the infrastructure, and the current economic uncertainty associated with the parameters used to determine a reasonable payback for such a large and complex project.

VAM technology (including RTO)

Methane, the principal component of natural gas, is often present in deep coal seams where it presents a safety hazard to miners (due to the fact that it is explosive in concentrations ranging from 5 percent to 15 percent in air), thereby requiring underground coal mines to employ large-scale ventilation systems. These systems dilute methane released into the mine workings as coal is extracted and remove it from the mine in order to maintain safe working conditions. In-mine methane concentrations must be maintained well below the lower explosive limit, so ventilation air exhausts at gassy mines carry only very dilute concentrations of methane (typically, below 1 percent, and often below 0.5 percent). Because flow rates are so high, VAM constitutes the largest source of methane emissions at most mines. (Source: http://www.epa.gov/cmop/docs/vam_technology.pdf.)

Federal health and safety laws require underground coal mines to operate underground ventilation systems in order to prevent the buildup of potentially explosive methane at underground locations. The collected methane gas is emitted to the atmosphere via ventilation fans located at the surface of each mine. The methane that is collected underground is diluted by the ventilation airflow to concentrations that are far below methane's flammability limits.

In a required report submitted to the BLM by MCC (*West ELK Mine E-Seam Gas Economic Evaluation*, September 29, 2009; this document contains confidential business information and is not intended for Agency dispersal), MCC provided an assessment of one potential technology, regenerative thermal oxidation (RTO), which could potentially control such dilute levels of VAM. The technology incorporates adsorption media at the gas inlet to separate out and concentrate the VAM exhaust to the particular saturation point of the media. When fully saturated, the media is then regenerated by heating and releasing contaminates from the media, which are fully oxidized via combustion in the process. Other than reducing the global warming potential (GWP) of the VAM

(methane to carbon dioxide on an adjusted mass basis), the technology in the configurations considered offers no options for energy recovery or use of the resource. A more detailed assessment should also be made to fully understand the indirect GHG components of the additional fuel and electrical loads necessary in order to operate the equipment.

The use of VAM as an alternative is a safety item addressed that would be addressed by the MSHA, on a case-by-case basis, in order to ensure the safety of miners. Greenhouse gases/compliance with the Clean Air Act is regulated by the EPA and by the CDPHE in the permitting process. MCC's ventilation air flow quantity is much higher than anything that has to date been demonstrated as effective with this technology. (Source: http://www.epa. ov/cmop/docs/World-Coal-article_May2010.pdf,). In addition, the agencies involved in this analysis do not know if VAM destroyers on the market are compatible with the specific design of MCC's MSHA-approved ventilation system. (Source: http://www.epa.gov/ cmop/docs/vam_ technology.pdf) Further, MCC does not believe that this is an economically viable option at this time, due to the low percentage of methane in their ventilation air.

If the capacity, design, and feasibility of a VAM system were addressed by permitting agencies, there would still be a concern that this technology would require large acres of disturbance for surface facilities, including roads and utilities. There would likely be additional disturbance and air emissions from a VAM collection system and combustion of VAM in roadless areas.

Lease addendums have been added to the parent leases, in the form of stipulations that would be carried forward to the lease modifications that address this possible mitigation measure. The stipulations require MCC to prepare annual reports on the feasibility of VAM reductions or reuse (among other potential control options) for CMM. The stipulation requires that the analysis is carried out to show whether or not a mitigation alternative is economically feasible and protective to the health, safety, and lives of the miners.

Mitigate the potential greenhouse gas emissions of the project by requiring MCC to purchase of carbon credits or do off-set mitigations

It was suggested that MCC be required to purchase carbon credits as mitigation for methane. Congress may develop cap-and-trade legislation as a means to reduce greenhouse gas emissions. Under "cap-and-trade," the government sets a limit or a *cap* on the amount of a pollutant that may be emitted. The limit or cap is allocated or sold to businesses in the form of emissions permits, which then represent the right to emit or discharge a specific volume of the specified pollutant. Under this type of legislation, businesses are required to hold a number of permits (or "carbon credits") equivalent to their emissions. Generally, one carbon credit is equal to one tonne (metric ton) of carbon dioxide or carbon dioxide equivalent gases. The total number of carbon credits cannot exceed the established cap, limiting total emissions to that level. Businesses that need to increase their carbon credits must buy from those who require fewer carbon credits ("trade".) The goal of cap-and-trade legislation is to allow market mechanisms to drive industrial and commercial endeavors where carbon emissions are constrained (or limited); to date they are not constrained in the US. Since GHG mitigation projects (such as those listed for flaring or capture above) generate carbon credits, the sale can be used to finance carbon reduction projects between trading partners around the world. Currently, purchasing carbon credits is a voluntary financial investment that MCC may choose to entertain for business reasons. The federal agencies are not involved in any financial investment decisions that MCC makes as a corporation. Since no cap has been established, there is no need to require purchase of carbon credits as mitigation measure for this leasing analysis.

While other specific off-set (or off-site) mitigations may be possible, they have not been brought forward for consideration related to this leasing analysis.

Prevent all future disturbances from road construction, methane drainage well pads and the like in Roadless Areas.

The environmental consequences from an alternative that considers prevention of future surface disturbance is already covered by consideration of Alternative 1. Therefore, CEQ NEPA regulations describe this situation as having been covered by prior environmental review (Sec. 1506.3).

Prohibit road construction within the lease modification areas but allow construction of MWDs using Horizontal Boreholes or Directional Drilling

technology

An alternative that considers prohibiting road construction within the lease modification areas but allowing the use of directional drilling is discussed for technological challenges relative to this mine. This post-lease development scenario related to other methods of installing Methane Drainage Wells (MDWs) had had been addressed in the E Seam EIS (http://www.fs.fed.us/nepa/fs-usda-pop.php/?project=19510) for this mine and updates have been added to the project record to document additional findings since that document was prepared. Lease notices had previously been added to the parent leases and will be carried forward to the lease modifications which address development scenarios for Roadless Areas (see Section 2.1 Stipulations). These activities, while not specified at the leasing stage, are consistent with effects for Alternatives 2 should their challeges for this mine be overcome. CEQ NEPA regulations describe this situation as having been covered by prior environmental review (Sec. 1506.3). Additional discussion on methodology follows.

Regardless of how they are accessed, drill pads still need to be constructed and large-diameter boreholes would still need to be completed to achieve effective methane drainage. Drill pad construction would require the use of heavy equipment such as a tracked dozer and a backhoe to dig mud pits. Depending on the terrain, a tracked backhoe may also be needed.

Large diameter drill-holes are required for methane drainage. Smaller drill rigs are normally used for drilling exploration (used to gather information on geology) holes and are an entirely different drilling method than the air-foam rotary rigs used to drill large-diameter holes. Large-diameter holes are necessary for the effective removal of methane as the vacuum exhausters used to accomplish degasification will not operate given the increased resistance of smaller diameter holes. More discussion can be found in the project file regarding drill rig capacities.

Use Horizontal Boreholes or Longhole Horizontal Boreholes

Mine Ventilation Plans including design of ventilation system are approved by MSHA from submittals and measurements made by MCC. MCC has analyzed the use of directional drilling to achieve degasification goals from sites outside roadless and has noted the following:

It has been MCC's experience drilling directionally in the B seam that directional holes must be drilled such that the producing part of the well above the seam is vertical. This vertical distance is projected to be 150 feet minimum in the E seam methane drainage wells. If such holes fail to achieve vertical in this portion of the well, they are subject to collapse and are ineffective as degas holes. The maximum safe angle of drilling (above this minimum vertical section) that can be achieved by the drilling equipment available is 45 degrees. The drill mast is set at 45 degrees to begin the holes. This angle must be gradually corrected to vertical during the drilling process. The maximum allowable dog-leg in directional drilling is 4 percent, in order to be able to successfully install casing in the hole.

Given the parameters of overburden depth, as it relates to physical constraints of directional drilling, MCC is unable to reach the required methane drainage targets from outside the roadless boundary.

Based on preliminary plans these types of boreholes alone are inadequate for proper ventilation and efficient mine operations. These methods are already used by MCC where possible. Therefore the MDWs cannot be drilled from outside roadless using this method.

Directionally Drill MDWs from Outside Roadless

Directional drilling is limited by the thickness of overburden (or amount of rock) overlying the coal E seam. This limited thickness of overburden precludes the ability to drill exclusively from outside the IRA boundaries and hit the MDW targets needed in the ventilation plan. MCC expended a tremendous effort over a three-year period in an attempt to find a means to successfully accomplish degas drainage using the in-mine horizontal drilling system.

These holes were drilled in the gateroads of the 14-17 panels and connected to a massive collection system to exhaust the gases from the mine. The conclusion of this effort was that the holes could not be drilled large enough, or stay open long enough, to allow safe mining of the coal (due to resulting high methane concentrations). They were simply very inefficient collectors of minimal quality gas, due to the limits of the drilling equipment in this application and the location of the gas producing zones within the overlying strata. In MCC's previous experience in the B Seam approximately 13 percent of total mine methane was able to be vented horizontally (extracted from BLM analysis, 2007). Any attempt to degas the E seam via the horizontal drilling system has the same issues and possibly more due to constraints of the overlying strata.

Therefore, use of directional drilling opportunities has been used as much as possible, however because in places the overburden is not thick enough that directional drilling either from outside the roadless area is practical or possible, therefore operations must be placed in the roadless area.

Shrink the boundaries of the lease to conform to the area where the coal will be mined underground

The mine plan is approved in a later permitting process by DRMS and OSM. The longwall panels proposed by MCC are based on current, yet limited knowledge of the geology. As panels are developed, they could be longer or shorter, depending upon conditions found during development. If the area to be mined is limited, it could cause bypass of mineable coal. Therefore, where actual subsidence or mining may occur is not known at this time. The estimated subsidence, derived from the RFMP for each alternative is described Section 3.4.

Reject one application and place stipulations on the other

An alternative requesting agency consent/leasing for only one of the two lease modifications, while rejecting the other, was considered but eliminated from further analysis. This request appears to stem from concerns regarding post-lease development roadless effects. In consideration of the Federal coal leasing process, the Forest Service and BLM have followed their agency-specific regulations and policy. The Forest Service has completed the Unsuitability Criteria (Appendix B) and roadless consultation process pursuant to Secretary's Memorandum 1042-156. In addition, both lease modifications are in areas identified in Forest Service and BLM respective Land Management Plans as compatible with leasing. At the leasing stage, the Forest Service relies on the expertise of the BLM in making determinations of mineable resources (described in Appendix A of this document). Based on the BLM's review of this alternative, it is not considered in detail for the reasons described below. The BLM may modify the lease in order to include all or part of the lands applied for *if* it is determined that:

- The modification serves the interests of the United States;
- There is no competitive interest in the lands or deposits; and
- The additional lands or deposits cannot be developed as part of another potential or existing independent operation [43 CFR 3432.2(a)].

The BLM reviewed the lease applications and has determined that *both modifications together* meet the above-mentioned requirements. In addition, in accordance with the requirements of the MLA, the MLAAL, the FCLAA, the FLMPA, the Energy Policy Act of 2005, 43 CFR 3400, and all other applicable laws, rules, regulations, standards, policies, and guidelines, the BLM is required to facilitate the recovery of known Federal coal reserves; to make Federal coal reserves accessible for development; and to foster and encourage the orderly development of domestic coal reserves. The purpose and need for the BLM, in relation to their Proposed Action, is to respond to the coal lease modifications application as required by law, and to: approve the modifications, as proposed, in order to prevent the bypassing of approximately 10.1 million recoverable tons of Federal coal (considered under Alternatives Considered but Eliminated from Detailed Study); to approve the modifications, with design features, in order to prevent the bypassing of approximately 10.1 million recoverable tons of Federal coal (considered under Alternatives 2 & 3); or to deny the proposed modifications (considered under No Action Alternative). The coal lease modification tracts would allow a more efficient mine layout that improves access to more coal reserves in the parent lease area thus preventing bypass of coal reserves within an existing lease. Approving one lease and not the other would not fulfill requirements of the FLPMA (as it relates to unsuitability criteria), or other applicable laws, rules, regulations, policies, standards, or guidelines that apply to BLM; nor would it meet the purpose and need of BLM's leasing decision.

Protect values of the area by using this set of stipulations for the Proposed Action

Protect a number of values by adopting the following no surface occupancy (NSO) stipulations (*proposed stipulation* is followed by response):

- *NSO stipulations prohibiting road and MDW well pad construction within ¼ mile of the hiking route known as "Sunset Trail," which traverses the lease modification, to protect recreational values.*

GMUG Forest Plan indicates (III-68) coal mining is prohibited on trails on the National System of Trails in "Further Planning Areas" (i.e., areas identified in the Rare II inventory for wilderness designation). The West Elk Roadless area is not a further planning area and the Sunset Trail is not on the National System of Trails (examples on the GMUG include Crag Crest Trail, Continental Divide National Scenic Trail, etc), it is simply a forest non-motorized trail that is mostly overgrown with minimal use by the public. Recreational values according to the Forest Plan for this management area could range from semi-primitive non-motorized to roaded natural or rural. Further, the Alternatives 2 & 3 include a lease notice that addresses development scenarios for Roadless Areas.

- *NSO stipulations prohibiting road and MDW well pad construction for all areas within ¼ mile of: (a) all lynx denning habitat; (b) all lynx winter foraging habitat; and (c) all lynx foraging habitat which is adjacent to lynx denning habitat.*

Appropriate stipulations specific to Lynx and related to Threatened and Endangered species are in Alternatives 2 & 3. Lynx stipulations included are consistent with the GMUG Forest Plan 2008 amendment, Southern Rockies Lynx Amendment and the Endangered Species Act. Further, the Forest Service has consulted with the USFWS regarding Canada lynx. CEQ NEPA regulations describe this situation as having been covered by prior environmental review (Sec. 1506.3).

- *NSO stipulations prohibiting road and MDW well pad construction for all areas within ¼ mile of a water influence zone (WIZ).*

The GMUG's Water Influence Zone is defined as: The land next to water bodies where vegetation plays a major role in sustaining long-term integrity of aquatic systems. It includes the geomorphic floodplain (valley bottom), riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is 100 feet or the mean height of mature dominant late-seral vegetation, whichever is most. The Watershed Conservation Practices Handbook 12.1 Management Measure (3) states in the WIZ "allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition." Lease stipulations addressed in the Alternatives 2 & 3 address the concern of activities in the WIZ.

- *NSO stipulations prohibiting road and MDW well pad construction for all areas within ½ mile of the West Elk Wilderness boundary, to protect roadless, wildlife, scenic, and other values.*

The West Elk Roadless area was not brought forward as a further planning area during the RARE II wilderness inventory. Unlike Oil, Gas and Geothermal development (Forest Plan III-54), coal leasing does not provide any conditions that would warrant the issuance of an NSO buffer stipulation in this area (Forest Plan III-66). Further, Alternatives 2 & 3 include a lease notice that addresses development scenarios for Roadless Areas. Recreational values according to the Forest Plan for this management area could range from semi-primitive non-motorized to roaded natural or rural.

- *NSO stipulations prohibiting road and MDW well pad construction within ¼ mile of any old growth forest to prevent fragmentation.*

Should old growth be present if and where surface disturbing activities are proposed in mature/over-mature classes, the GMUG Forest Plan (page II-9a, II-9b) allows for removal of 70-80% of these stands assuming residual patch sizes are met. If the RFMP were implemented in Alternative 3, it is estimated that up to 61 acres of mature/over-mature aspen (0.3% of vegetation unit), and 7 acres of mature/over-mature spruce-fir (0.09% of vegetation unit) may be disturbed. These are both only a tiny fraction of that allowed to be removed under forest plan standards to protect structural diversity related to old growth. No old growth has been specifically defined in the lease modifications.

- *NSO stipulations prohibiting road and MDW well pad construction within ½ mile of any raptor nest site.*

There is no need for an NSO stipulation related to raptor nest sites as it is covered by survey and timing limitations requirements in Alternatives 2 & 3 for sensitive raptors in Colorado as identified by R2 list. CEQ NEPA regulations describe this situation as having been covered by prior environmental review (Sec. 1506.3).

- *NSO stipulations prohibiting road and MDW well pad construction on slopes greater than 40% to protect soils and prevent erosion.*

A stipulation that requires restrictions for no surface occupancy to be allowed in "areas of high geologic hazard or high erosion potential, or on slopes which exceed 60%" and a stipulation that requires "special interdisciplinary team analysis and mitigation plans detailing construction and mitigation techniques would be required on areas where slopes range from 40-60 %…the interdisciplinary team could include engineers, soil scientist, hydrologist,

landscape architect, reclamation specialist and mining engineer" already exists as part of the Alternatives 2 & 3. These stipulations are required by the Forest Plan and supported by the Watershed Conservation Practices Handbook (FSH 2509.25). CEQ NEPA regulations describe this situation as having been covered by prior environmental review (Sec. 1506.3).

2.3 Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2.3. Comparison of Alternatives.

Resource Area	Alternative 1 (No Action)	Alternative 2 (2001 Roadless Conservation Rule)	Alternative 3 (Colorado Roadless)
Air Quality, Greenhouse Gases & Climate Change	No exceedances of Air Quality Standards. Greenhouse gases: • Methane 383,250-574,875 tonnes of CO_2 equivalent released per year based on on-going mine activities. • CO_2 release continued at current rates.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	As there would be no change in mine production rate influencing emissions, effects to air quality would be the same as Alternative 1 except the duration would be extended approximately 1.6 years.
Topographic & Physiographic Environment	No change.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Subsequent mining may result in surface subsidence of up to 8 feet.
Geology	Geologic instabilities would continue at historic magnitudes.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Subsidence may aggravate existing geologic hazards, create surface cracks, and cause localized seismic events. Lease stipulations should minimize effects. Mining of coal would also reduce future recoverability of oil and gas resources.
Soils	No change from current condition.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Cracks and other self-healing surface expressions of subsidence. Approximately 72 acres may see some soil loss and reduced productivity due to post-lease surface disturbance. Lease stipulations and best management practices should minimize effects.
Water	No mining induced effects on water resources in the lease modification area.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Subsidence may alter surface and groundwater hydrology by altering groundwater regimes, surface water drainages, seeps and stock ponds. Water quality may be impacted by sedimentation or

Resource Area	Alternative 1 (No Action)	Alternative 2 (2001 Roadless Conservation Rule)	Alternative 3 (Colorado Roadless)
			water derived from mining activities. Monitoring, best management practices, permitting and lease stipulations should ensure that impacts are minimized.
Vegetation	Ongoing management activities and Sudden Aspen Decline will continue to impact vegetation in the lease modification area.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Subsidence is expected to have minimal disturbance on vegetation. Post-lease surface disturbance is expected to remove vegetation from up to 72 acres. Reclamation requirements will ensure that appropriate species are used to revegetate the area and return it to productivity.
Threatened & Endangered Species	No change over existing conditions and management.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Canada lynx-may affect, but is not likely to adversely affect. Four Big River Endangered Fish-fish not present but water depletions may affect these species. Water depletion is consistent with Forest's Programmatic Biological Opinion.
Sensitive Species	No change over existing conditions and management activities.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	American marten, pygmy shrew, northern goshawk, boreal owl, olive-sided flycatcher, flammulated owl, American three-toed woodpecker, northern leopard frog, and purple martin-"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing." Colorado tansy aster-no effect. Rocky Mountain thistle-not known to date in lease modification area, but habitat may be enhanced from disturbance associated with post-lease development.
Management Indicator Species	No change over existing conditions and management activities.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Elk, Merriam's wild turkey, and red-naped sapsucker-negative effects are of short duration and magnitude and do not result in a forest-wide decrease in trends or deter from meeting the MIS objectives in the Forest Plan.

Resource Area	Alternative 1 (No Action)	Alternative 2 (2001 Roadless Conservation Rule)	Alternative 3 (Colorado Roadless)
			(Other MIS species are addressed as Sensitive Species)
Migratory Birds	No change over existing conditions and management activities.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Stipulations requiring breeding bird surveys and including timing restrictions where needed for specific species, may mitigate impacts to migratory birds. However, some bird habitat will be altered in the short term as a result of post-leasing development resulting in a type- conversion of 72 acres, and that is likely to impact individual migratory birds, especially passerines and other birds which utilize aspen, spruce-fir, and oak for nesting.
Range Resources	No change over existing conditions and management activities.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Post-lease development may result in forage loss, subsidence related damage to stock ponds, fences being altered, cattle guards filling in, grazing management/ distribution problems, cattle drift onto private land and noxious weeds. Following best management practices and coordination with Range Conservationist/ permittees when post lease development is proposed will minimize these effects.
Recreation	No impact.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	No change to recreation opportunities available. Subsidence cracks may form on trail #780 but would be expected to be minor. Post-leasing development may improve access on NFSR 710 and cause big game to temporarily move out of the area.
Transportation System	No change over existing uses	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	No subsidence-related damage to system roads would occur from mining coal in the lease modifications. Post-lease development traffic on NFSR 711 and 710 in the lease would be consistent with current activities. New post-lease roads would

Resource Area	Alternative 1 (No Action)	Alternative 2 (2001 Roadless Conservation Rule)	Alternative 3 (Colorado Roadless)
			not be open to the public consistent with recent Travel Management Plan.
Roadless	No change over existing uses.	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	Post–lease development temporary roads and MDW pads would impact roadless character and values consistent with Colorado Rule.
Heritage Resources	No impact.	No potential to affect cultural resources. On-the-ground surveys will be needed for site-specific ground-disturbing activities and is enforced by the lease stipulation.	No potential to affect cultural resources. On-the-ground surveys will be needed for site-specific ground-disturbing activities and is enforced by the lease stipulation.
Visuals	No change over existing conditions and management activities	The effects would be similar to Alternative 3 but slightly reduced in scale because road construction would not occur.	No major impacts to visual resources are expected from subsidence or subsidence-related events. Post-leasing development is not likely to be seen from public travelways, but topographic and vegetative screening will also prevent visual intrusion
Socioeconomics	Rents, royalties, payments to counties would be lost based on the quantity of coal bypassed. Effects extend beyond the Forest boundary to fee coal reserves that also would be lost.	Royalties and payments to counties would be received based on the quantity of coal recovered as would the mining sector. Effects may extend beyond the Forest boundary to fee coal reserves and parent leases with this alternative with their associated royalties, rents and effects on mining sector.	The mining sector and associated rents, royalties, and payments to counties would be extended in proportion to the quantity of coal mined. Operations would be extended approximately 1.6 years.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.0 Introduction

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the environmental effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

Lease issuance by the BLM vests with the lessee a non-exclusive right to future exploration and an exclusive right to produce and use the coal resources within the lease modifications area, subject to existing laws, regulations, and the terms, conditions and stipulations in, or attached to, the lease (USDI BLM, 2008). Lease issuance alone does not authorize or result in any mineral resource recovery or ground-disturbing activities. Thus, issuance of a lease modification has no direct effects on the environment; however, it is a commitment of the resource for potential exploration, mining and development, and reclamation, subject to further review and permitting actions.

Short-term and Long-term Effects

Unless otherwise specified, short-term is the life of the project. Long-term effects are defined as those that would occur after coal is mined.

Direct and Indirect Effects

Direct effects are caused by the action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Direct and indirect effects analysis for each alternative and each resource are based on description of the alternatives provided in Chapter 2, including conditions of approval and assumes that all stipulations would be implemented as described.

Cumulative Effects

Cumulative impacts are impacts on the environment that result from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

3.1 Ongoing and Proposed Activities

The following are descriptions of past, present and reasonably foreseeable future actions for use in the cumulative effects analysis. Individual cumulative effects environments are described in each of the resource analyses later in this chapter.

General Background

Coal mining has been one of the dominant land uses in the North Fork of the Gunnison River area. Underground mining has occurred in this area for the past 100 years. Coal mining has occurred on both private and public lands in the general area. There are currently three operating coal mines in the North Fork Valley. These are the Bowie No. 2 Mine, the Elk Creek Mine, and the West Elk Mine.

West Elk Mine

1981 to present

The mine has been operating for 29 years and holds about 14,395 acres of federal coal leases and 3656 acres of fee coal lands. Subsidence on NFS lands has occurred north of the proposed COC-1362 and COC-67232 lease modifications. Minor surface tension cracks are visible in places on the surface. Topography has lowered between two and ten feet across the existing subsided areas. MCC is in the process of mining E-Seam reserves in existing portions of COC-1362 and COC-67232 leases.

Surface facilities including office, warehouse, shop, coal handling facilities are located about 6 miles north of the proposed modifications. These existing facilities would also be used for mining the proposed modifications.

According to MCC's 2011 reclamation report, approximately 477 acres have been disturbed at the West Elk Mine; of that, approximately 71 acres have been reclaimed (regraded and reseeded).

Coal Exploration Drilling 1990s- 2000s

Eleven exploration holes (6 north of and 5 west of the modification areas) are within ½ mile of the modification tracts; most were drilled in the 1990s to early 2000s. Some access roads are still visible. Reclamation success has returned lands to prescribed uses. Road closures and/or obliteration are inhibiting traffic. Portions of old drill roads and some pads are currently being used for a methane drainage project.

Geophysical Exploration since 1999

A shallow seismic survey was performed along Deep Creek in 1999. Shallow shot holes were drilled and then reclaimed. A field survey in September 2004 showed no visible residual effects. A shallow seismic survey was approved for Box Canyon in 2005, about 3 miles north of the lease modifications. It was a short-term survey; no residual effects after reclamation were realized.

Methane Drainage Wells 2008 to present in vicinity

In 2008, MCC was approved to install 168 methane drainage wells (MDWs) from 146 locations over existing leases north of the proposed modifications. Fifty (50) approved methane drainage drill locations lie within a one-mile area north of the project area (both developed and undeveloped). The only development and reclamation that has occurred within a one mile radius of the proposed modifications is the development of the E4-68 well pad and its access road (roughly 2950 feet long) on the west side of Deep Creek and the access (roughly 1800 feet long) to the E4-80.5/81.5/83 MDW pad and the pad itself on the east side of Deep Creek. These access roads and pads have had interim reclamation until future use is needed.

There are 118 proposed methane drainage wells that lie within a two mile radius of the proposed lease modification area. Of these 118 wells to date, 27 have been developed, drilled and have had interim reclamation in the E1-E3 panels. Another 8 wells on the west end of the E3 panel will be drilled summer 2012.

Within the past 3 years, MDWs and associated access activity in MCC's nearby lease holdings and permit area have been approved to disturb approximately 204 acres. About 65 acres have been disturbed to date and MDW locations not in active use have had interim reclamation completed awaiting their future use.

Next 10 years

Previously approved mining would continue including the related activities related to mine ventilation such as installation of MDWs and roads to access them in the parent lease areas of these modifications for at least the next decade. Mining sequence will continue in a north to south manner then west onto fee lands. Mine life is currently projected for 11-12 additional years of federal coal reserves with perhaps as much as 2 additional years on fee reserves. There may be a continued need for post-lease surface use related to maintaining mine seals, continued reclamation activities, etc. in any of West Elk's lease holdings.

Wildlife Past 20 years, Present and Future

A 600-acre prescribed burn occurred in a mountain shrub area about one mile northeast of the modifications in 1992 for wildlife improvements. The area has been effectively revegetated in mountain shrub and oak.

Range use/ improvements Past 100 years

NFS lands have been grazed for many years and are currently managed under a deferred rotational strategy. MCC also leases private land for grazing. No changes in the grazing system are planned. Existing range features and improvements include stock trails, fences, and several small stock ponds.

In 2010, a 585 acre prescribed burn occurred in a mountain shrub area about 3 miles west of the proposed modifications.

Recreation Past 20 years, Present and Future

The lease modifications area has no developed recreation sites. Dispersed recreation includes camping, use of all-terrain vehicles (ATVs), and horseback riding on a limited basis. Occasionally, National Forest System Road (NFSR) 710 is used for dirt bikes and mountain cyclists. Primary use occurs during hunting seasons. No recreation developments are planned. A non-motorized system trail, the Sunset Trail, cuts through the lease modifications. It is not often used and is difficult to navigate through the project area. There are no system trails in the lease modification area that access the West Elk Wilderness. Numerous stock, range improvement and wildlife trails cross the lease nomination areas.

Inventoried Roadless Areas (IRA) 1979 to present

The majority of the lease modifications are located in the West Elk IRA, inventoried in 1979 as part of Roadless Area Review and Evaluation (RARE II), but was not carried forward for wilderness designation. The IRA was not designated for management as roadless in GMUG Forest Plan or as further planning area. A 1993 evaluation determined that the West Elk IRA had compromised roadless character and was reevaluated in the 2002 EA for Methane Drainage, as well as the 2008 EIS for E-Seam development.

The Sunset Trail Roadless area is a small subset of the West Elk Roadless that came about in the Draft Forest Plan Revision, a plan that has been rescinded because of litigation over the Planning Rule(s); this name is also the designation used for the Colorado Roadless Rule with boundary adjustments. Various documents describe this parcel in different ways. Much of the West Elk Roadless Area (current Forest Plan designation) has compromised character due to management activities before and after 1979 including roads, ditches, reservoirs, full-size trails, etc. Forest Plan prescriptions have guided the management of the area from the date of the Plan and intermittently when the 2001 Roadless Rule had not been in effect. Road construction or reconstruction in the IRA is subject to rules or directives in place at the time activities are proposed on the parent leases and a stipulation that addresses development scenarios for Roadless Areas is included in the Proposed Action. The Forest Plan allows for road building in this area.

Road and Trail System Past 30 years and Present

CR 710/NFSR 710 is the primary access used by forest visitors, range/special use permittees, and MCC into lands near the lease modification area and private coal reserves. The road is low standard and maintained for travel in high clearance vehicles. MCC has performed maintenance in the past 10 years on portions of this road. Other temporary roads on forest have been constructed and reclaimed in the past 15 years for coal exploration or other drilling purposes and many more on private/fee land.

Natural Gas Development Future

This area was made available for oil and gas leasing in the 1993 GMUG Oil and Gas Leasing EIS ROD. There has been interest in obtaining gas leases to use the methane resource although no gas leases cover lands within the lease modifications. The BLM has officially designated mineral resources to be primarily managed for coal. There are no gas pipelines in the area.

MCC and BLM are currently working on potential strategies for gas utilization. MCC is also working with the Environmental Protection Agency in EPA's CMOP program.

Methane Emissions Past 5 years (Air Quality)

MCC began draining methane from the underground mine via methane drainage wells in 2001. Monitoring since then shows current MDWs in the E Seam have an average active life of about 1-3 months. Approximately 2 or 3 MDWs are actively draining methane at any time. See Section 3.3 for further discussion.

Other Actions Known or Proposed in the Vicinity with Potential Cumulative Effects

The following projects are in the general North Fork area. They are included because cumulative effects of these projects may combine with those of the lease modifications.

- Modification of Federal Coal Lease COC-61357, Tract 5 (Oxbow Mining, LLC) will extend, for a few weeks, air quality and methane impacts consistent with existing (background) levels. No post-lease surface is anticipated other than subsidence.
- East Elk Creek Lease-by-Application (Oxbow Mining, LLC) will extend air quality and methane impacts consistent with existing (background) levels.
- Bowie Coal Lease Modifications COC-37210 and COC-61209, currently in analysis (decision expected soon) will extend air quality and methane impacts consistent with existing (background) levels.
- Oak Mesa Coal Resource Exploration Drilling (Oxbow Mining, LLC), currently in analysis; cumulative effects could be expected as they relate to additional vegetation/habitat disturbance until exploration holes are reclaimed.
- Bull Mountain Unit Master Development Plan (SG Interests) proposal is to drill up to 150 oil/gas wells; currently in analysis. Cumulative effects would be expected as they relate to criteria air pollutants and visibility within the airshed.
- Applications for Permit to Drill 2 wells (Gunnison Energy Corp); Cumulative effects would be expected as they relate to criteria air pollutants and visibility within the airshed and additional vegetation/habitat disturbance.
- BLM has deferred an August 2012 Oil and Gas lease sale until further environmental review. This is an administrative action, proposing to lease approx. 30,000 acres, with no surface disturbing activities proposed. There is no guarantee that leases will be purchased. However, if leases are purchased, then subsequent permitting actions and NEPA analysis would be required to develop them. At this time, there is only speculation regarding cumulative effects.

The Oxbow and Bowie lease modifications, like the West Elk Mine modifications, are continuing actions (continue current rate of production in new areas) as analyzed for the original mine, and included an emissions inventory and modeling analysis. That emissions inventory quantifies PM_{10}, nitrogen dioxide, and sulfur dioxide emissions. The modeling analysis also includes a visibility impacts assessment in the West Elk Wilderness Area, as well as an atmospheric deposition impacts assessment. Emissions that were calculated and modeled included tailpipe emissions from mining equipment, haul trucks, and locomotives (railway emissions). The results of that detailed impact assessment predicted no significant impacts to air quality as a result of authorizing the mines listed above in the assessment. Further, operators of the Oxbow Mine recently submitted air emissions modeling to APCD in order to incorporate several of their stand-alone construction permits into a single APCD authorization document. The modeling included emissions for the West Elk Mine for a cumulative analysis. It is inappropriate to draw any conclusions about the Oxbow analysis at this time because the Permit has not been issued, and the acceptability of the model results has not yet been evaluated by the APCD, which has authority for such matters. These air impacts are considered as part of the existing condition in Section 3.3.

3.2 Reasonably Foreseeable Future Development

Because a leasing decision itself does not involve any mineral development or surface disturbance, it is necessary to project the amount of surface use or activity that will likely result during lease development in order to disclose potential effects and inform decision-making. To facilitate analyzing potential surface impacts due to underground mine subsidence and normal mine operations, this analysis assumes a reasonably foreseeable mine plan (RFMP) for the various action alternatives within this leasing decision. In order to effectively analyze potential indirect effects and cumulative impacts, for alternatives that allow for surface occupancy and use this analysis assumes a scenario of potential surface use and potential post-lease activities on the land surface.

Within this EIS there are two action alternatives, one under a 2001 Roadless Rule framework, the other under a Colorado Roadless Rule framework.

It must be noted however, that decisions pertaining to surface use and disturbance, with the exception of subsidence impacts, are not made at the leasing stage. Rather, the decisions related to permit-related surface activities are made when and if site-specific surface uses are proposed, and are evaluated through the State permitting process based on their own merits.

Alternative 3 Reasonably Foreseeable Mine Plan (RFMP)

The lease modifications for COC-1362 and COC-67232 contain an estimated 10.1 million tons of federal coal reserves in the E coal seam. For this analysis, it is assumed that the coal would be recovered using the longwall method of underground coal mining. The tracts are bounded on the north by currently leased federal coal, on the east by inferred unmineable coal (unleased), on the west by private land which contains an estimated 5.6 million tons of mineable coal, and on the south by wilderness. Therefore, it is assumed that access to the coal reserves in the lease modifications would most easily be achieved from underground workings at the West Elk Mine and surface facilities near Somerset, Colorado.

Production from the existing West Elk Mine approximates 6.5 million tons per year (tpy) using the longwall mining method, and is capable of peaking at a 7.0 million tpy rate. It is assumed for this analysis that the coal would be extracted at a 6.5 million tpy. No increase in coal production is assumed, and it is assumed that the coal would be transported to market using the existing coal handling facilities and existing spur rail line.

The RFMP for the lease modifications assumes the coal in the E seam would be extracted from portions of five longwall panels trending northwest-southeast. The panels in the lease modifications would include the start lines and the first few thousand feet of five panels that would extend west off the FS lands and into coal reserves under MCC's private land. The mining would "retreat" to the main entries of the mine. The continuous miner would be used to drive development entries for the longwall panels, with the primary coal production being achieved using the longwall equipment.

The E seam coal in the lease modifications would be mined over a period of approximately 3 years; however, E seam coal reserves in the modifications represent about 1.6 years of additional coal reserves based on the rate of mining currently employed at the West Elk Mine. In addition, it has been indicated, that the leasing and development of the lease modifications also allow for the production of 5.6 million tons of fee coal on adjacent lands (see project record), as well as an additional 3.3 million tons from existing adjacent federal coal reserves. Thus the lease modifications, if authorized, would extend the life of the West Elk Mine by approximately 2.9 years.

Some variations to these timeframes may occur based on time needed for permitting, unforeseen mining/geologic circumstances, coal contract variability, etc.

Subsidence

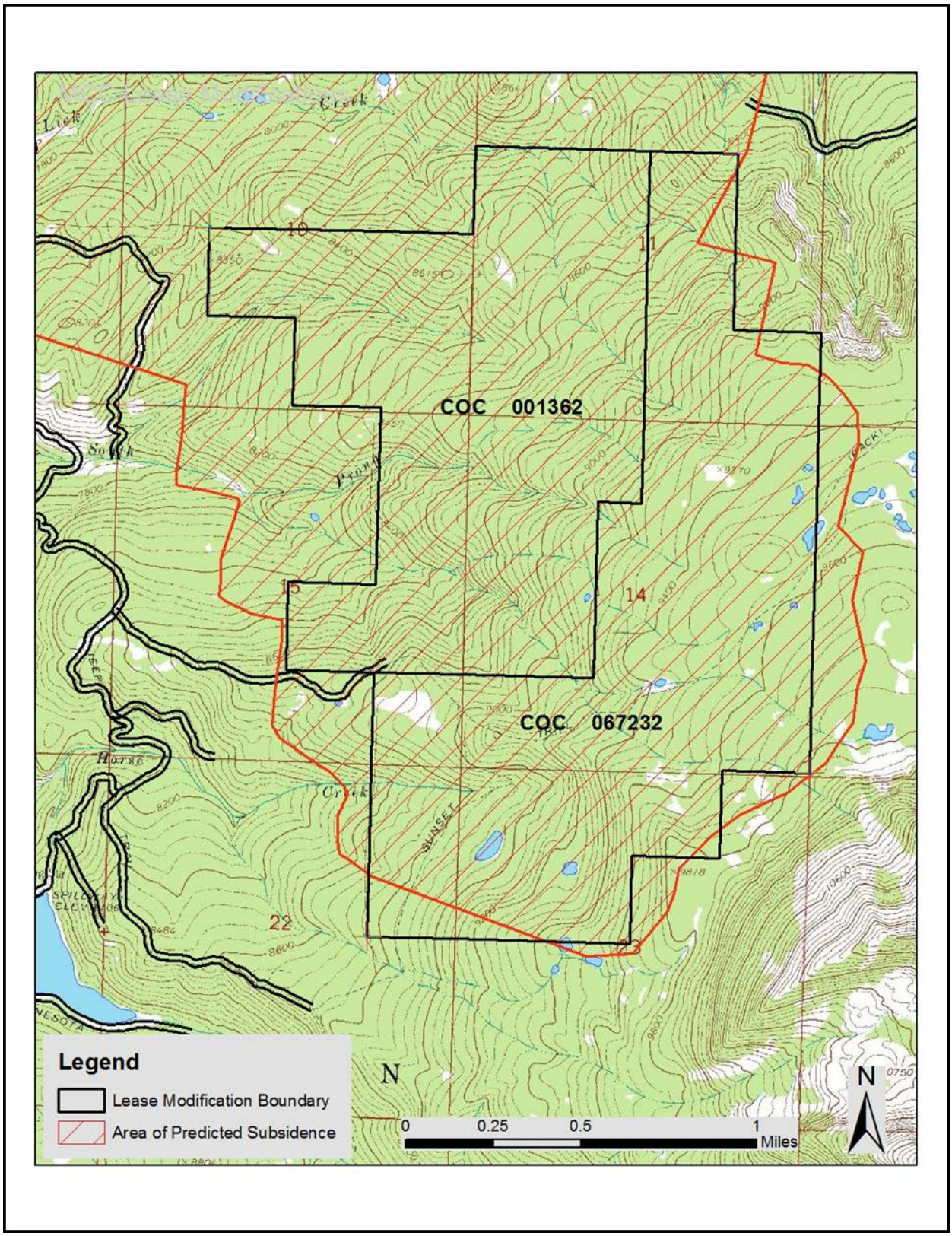
The most common subsidence related impacts are changes in topography. In addition to the lowering of the land surface, there are likely to be surface tension fractures. Tension fractures are more evident on hard-competent sandstone outcroppings, although tension fractures may also extend into colluvium, alluvium, and weathered bedrock. The majority of movement and changing stresses associated with subsidence over panels is usually completed within 12 months after longwall mining.

Within the lease modification areas, the average mining height of coal is expected to be 11 feet. As a general rule of thumb, through the mining process the overburden is subsided 70% of the mining height. So in the modification area, expect the land to be subsided up to 8 ft (see Figure 3.2 for expected area of subsidence). The effect on topography is also related to the amount of overburden (more cover, less subsidence), and the modification area ranges in overburden from 800 ft – 2,200 ft (avg. 1200 ft).

Subsidence associated with authorizing the lease modifications is expected to affect about 2,400 acres (includes additional adjacent reserves on private and federal lands made accessible via lease modifications). Other than lowering the land surface, the long-term effects of subsidence on surface topography would be minimal, and even unnoticeable to most casual observers. Overall, the topography above subsided longwall mining workings would be similar to the pre-mining topography, albeit lower in elevation.

Past observations have shown that surface tension cracks caused by subsidence would most likely occur on ridges and steeper slopes, particularly cliff / outcrop areas, where cracks might open on the order of a few inches to possibly one foot wide and 25 to 50 feet deep. Fewer cracks would occur in drainage areas than on ridges because the drainage areas are more stable and any alluvial/colluvial materials found in these areas tend to be more pliable than some of the brittle bedrock found on the ridges. Subsidence from longwall mining could aggravate the movement of existing landslides and rock falls. Subsidence and hydrology monitoring may require placement of monitoring devices on the land surface. These may include small subsidence monuments and survey markers. Access to the facilities may require motorized vehicles that would use the system of existing roads or trails.

Figure 3.2 Projected subsidence.



Alternative 3 Reasonably Foreseeable Surface Use and Disturbances

At the leasing stage, it is not possible to locate site-specific areas where potential surface uses may occur as there is no approved mining plan for the area at this time; therefore, the above surface use and disturbance estimations will be used to aid the cumulative impact analysis discussed in each resource section. If surface uses are proposed during the life of the lease (if it is issued), then the site-specific proposals will evaluated under the State mine permitting regulations, under their own merits at the time they are proposed.

MDWs

In recent years, the coal mines operating in the Somerset coal field have experienced the build-up of methane gas in the underground workings after the overlying rock strata have subsided into the mine void (called the gob). Under Mining, Safety and Health Administration (MSHA) regulations, mines are required to hold the methane levels below a concentration of 1% in the active working areas of the mine to ensure worker safety underground.

Typically, the in-mine ventilation system cannot effectively keep methane levels within safe working range, therefore additional methane liberation methods had to be employed. Existing operations at the West Elk Mine, as well other mines in the North Fork Valley, have used a system of methane drainage wells (MDWs) to assist in liberating methane from underground mine workings. These MDWs are drilled from the land surface into the strata overlying the coal, and use an exhausting blower to pull gas from the rock formation, and subsequently air from the mine.

The drilling technology used to drill holes the diameter and depth needed for MDWs also requires construction of drill pads and temporary roads on the land surface. Current MDWs are on the landscape an average of 2-3 years with an active life of 1-3 months, after which they are decommissioned, the land surface is reclaimed and returned to pre-mining land uses.

For the lease modifications, it is anticipated that MDWs will be needed in order to mine the coal. Other post-leasing surface disturbance that could be reasonably anticipated includes: exploration drilling, seismic exploration, ground water monitoring well installation, subsidence and hydrology monitoring facilities, and access roads needed for these facilities. For the purposes of the cumulative effects analysis in this document, it is assumed based on current mining practices, that about 72 total acres of surface disturbance would occur from mine operations over the life of the lease modifications (expected to be about 25 years from lease issuance to lease relinquishment and final bond release). Site-specific locations of anticipated disturbance cannot be identified at the leasing stage due to the fact that a final mine plan has not been approved.

For the purposes of this analysis, it is assumed that approximately 48 MDWs would be needed over the life of the lease modifications, corresponding to an estimated 48 acres of disturbance (making a conservative estimate requiring about 1 acre of disturbance per MDW pad; historically most MDW pads are 0.5 acres or less). Associated temporary road building associated with MDWs is estimated to be about 6.5 miles, corresponding to about 24 acres of disturbance assuming a 30-foot wide average disturbance width for a temporary road with a 14-foot running surface.

It is unlikely that all 48 MDWs would be constructed and or venting at the same time. Similar to what has been seen in other West Elk Mine operations, it is estimated that 6 to 8 MDWs would be in operation at any given time and life of an MDW varies from one to 3 years depending on placement in the panel. Typically, in a given summer, the MDWs for the next year's operations are drilled, and the MDWs from the panel mined two years previous are reclaimed. However, since the mine plan is not yet known, the exact number of wells that will be operational, constructed, or reclaimed each year is unknown.

It is assumed that any if any exploration drilling, staging areas, and ground water monitoring drill pads and access road construction are needed, they would utilize the same locations as those used for MDWs. Therefore, no additional surface use beyond that assumed above for MDWs will be analyzed in this document.

Table 3.2. Reasonably Foreseeable Surface Disturbance.

Reasonably Foreseeable Surface Disturbance from Future Operations	Disturbance Acreage	Estimated Duration of Disturbance
MDWs (48 at 1 acre each)	48 acres	2-3 years
Temporary roads (6.5 miles) for MDWs, exploration, seismic, monitoring wells, etc	24 acres	2-6 years, perhaps longer if required for post-mining monitoring
Total	72 acres	
Reasonably Foreseeable Surface Disturbance from Subsidence	**Disturbance Acreage**	**Estimated Duration of Disturbance**
Incidental surface lowering/disturbance related directly to subsidence	Approx. 2400 acres	Movement 90% complete when the longwall face has passed at 1.2 to 1.4 times the overburden depth. Usually 100% complete within 12 months.

Alternative 2 Reasonably Foreseeable Mine Plan (RFMP)

In the Reasonably Foreseeable Mine Plan (RFMP) under Alternative 2, consenting to lease would occur, but road construction would not be allowed in the modification areas. Although other surface uses (MDW pad construction and exploration pad construction) could take place for most mine operations, construction of access roads to those locations could not be authorized.

Alternative 2 Reasonably Foreseeable Surface Use and Disturbances

Alternative 2 requires that road construction and reconstruction be prohibited on IRA lands within the lease modifications. This results in the need to assume a modified surface use scenario for this alternative.

Methane drainage well construction is essential for operating longwall operations in the North Fork Valley. Normal mine ventilation alone does not allow for safe longwall mining in the North Fork Valley. Without MDWs methane builds up quickly during the longwall mining process. The current uses of MDWs are necessary to mitigate methane safety hazards making mine-air compliant with MSHA standards. For the West Elk Mine, MDWs are a required part of their MSHA approved ventilation Plan (see project record). Methane drainage wells, compared to conventional coal exploration holes or water wells, are large diameter boreholes that require steel casing throughout their entire length. MDWs and MWD pads would still be permitted under this alternative if there was a way to construct the pads and drill the wells without building roads. This could occur, for example, if equipment was able to be transported by helicopter or walked in/dragged in without the use of roads. The following analysis assumes this is possible but does not specify the method or circumstances under which it may occur, so impacts are limited to surface disturbances estimated under Alternative 3 minus the 24 acres (6.5 miles) of road.

3.3 Air Quality, Greenhouse Gases & Climate Change

This section discloses the affected environment and environmental consequences to air quality that would result from implementing the different alternatives under consideration. The discussion below details laws and regulations related to air quality, the current status of air resources in the area, and potential impacts to air quality that may result from extending the lifetime of the West Elk Mine if the lease modifications occur. This section was produced by BLM and Forest Service Specialists with EPA review.

Affected Environment

Legal Framework

The Clean Air Act, passed in 1970 and amended in 1977 and 1990, requires the Environmental Protection Agency (EPA) to set standards for air pollutants to protect the public health and welfare. The standards, known as National Ambient Air Quality Standards, limit the amount of these pollutants that can be present in the atmosphere. The EPA has set standards for six common pollutants known as "criteria" air pollutants—ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and carbon monoxide (CO). There are standards for two categories of particulate matter—one for suspended particles less than 10 micrometers in diameter (PM_{10}) and one for fine particles less than 2.5 micrometers in diameter ($PM_{2.5}$). Primary standards are designed to protect public health, while secondary standards are designed to protect public welfare. These standards are shown in Table 3.3a. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Table 3.3a. National Ambient Air Quality Standards

Pollutant [final rule cite]	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]	primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]	primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010]	primary	1-hour	100 ppb	98th percentile, averaged over 3 years
[61 FR 52852, Oct 8, 1996]	primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]	primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution $PM_{2.5}$ [71 FR 61144, Oct 17, 2006]	primary and secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]	primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[38 FR 25678, Sept 14, 1973]	secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(2) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour

ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1. (4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved

Unlike most other criteria pollutants, ozone is not emitted to the atmosphere directly; it is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. In general, ozone concentrations in the lower atmosphere are highest during warmer months and lower in the cooler months. In some parts of the western U.S., high winter-time ozone concentrations have been monitored. The project area is not in an airshed with monitored high winter-time ozone concentrations. The chemical reactions that form ozone are complicated and nonlinear, making it difficult to predict ozone concentrations that will result from increasing the amount of the ozone precursors (i.e., nitrogen oxides and volatile organic compounds) in the atmosphere. The effect of adding nitrogen oxides or volatile organic compounds to the atmosphere on the concentration of ozone depends upon the ratio of the two precursors already present. Ozone formation is also highly dependent on meteorological conditions, including temperature, wind speed, and solar radiation. Ozone in the lower atmosphere is harmful to human health and vegetation. Some fine particulates ($PM_{2.5}$), particularly ammonium sulfate and ammonium nitrate particles, can also be formed in the atmosphere from the interaction of either SO_2 or nitrogen oxides and ammonium. These types of $PM_{2.5}$ particles are referred to as secondary particulates, while particles emitted directly from a source are referred to as primary particulates.

Fine particulate matter ($PM_{2.5}$) is chiefly comprised of five mass types: organic mass, elemental carbon (also known as soot or black carbon), ammonium sulfates, ammonium nitrates, and crustal materials (i.e., soil). Primary fine particulate emissions result from combustion processes (including fossil fuel combustion and biomass combustion that occurs in wild fires) and include black carbon. In general, however, black carbon and crustal materials comprise a relatively small proportion of the fine particulate mass suspended in the atmosphere. The largest constituents of fine particulate are usually organic mass, ammonium nitrates, and ammonium sulfates. Secondary particulates do not result from emissions of fugitive dust (which is the largest emissions category from the West Elk Mine), and thus will not be discussed further in this document.

The Clean Air Act contains provisions for protection of air quality in areas that are meeting the ambient air quality standards. This is known as the prevention of significant deterioration (PSD) program. Under this program, areas of the country are designated as Class I, Class II, or Class III. Class I areas are defined as areas of special national or regional natural, recreational, or historic value. The Act established mandatory federal Class I areas including wilderness areas over 5,000 acres in size and national parks over 6,000 acres in size that were in existence in 1977. These areas receive special protection under the Act. All other areas of the country have been designated as Class II. An area's classification determines the maximum amount of additional air pollution, called an increment that can be added beyond a baseline value. Increment consumption analysis falls under the PSD major sources permitting program, which is administrated by the Colorado Air Pollution Control Division. Only small amounts of pollution can be added in Class I areas, while Class II areas permit moderate amounts of pollution to be added. Larger amounts of pollution can be added to Class III areas, but there are as yet no areas in the country designated Class III.

In Colorado, authority to issue construction permits that allow sources to emit air pollutants has been delegated by the Environmental Protection Agency to the state. Stationary sources are classified as major or minor, depending on the amount of pollutants emitted. In general, a construction permit is required for a facility with uncontrolled actual emissions of any criteria pollutant equal to or greater than the amounts listed in Table 3.3b:

Table 3.3b. Colorado Minor Source Permitting Limits for Attainment Areas

Criteria Pollutant	Attainment Area uncontrolled actual emissions in tons per year
volatile organic compounds	5
PM_{10}	5
Total Suspended Particulates	10
Carbon Monoxide	10

Criteria Pollutant	Attainment Area uncontrolled actual emissions in tons per year
Sulfur Dioxide	10
Nitrogen Oxides	10
Lead	200 pounds per year
*other Criteria Pollutants	2

* Other criteria pollutants include: fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, reduced sulfur compounds, and municipal waste combustor emissions. (Source: http://www.cdphe.state.co.us/ap/conperm.html#New or Modified)

In addition, the state can issue ambient air quality standards that are at least as stringent as the national standards. The state tracks the PSD increments in its Class I and Class II areas as part of its permitting program and is responsible for ensuring that the increments are not exceeded.

The Clean Air Act amendments of 1977 set a national goal of preventing future and remedying any existing impairment to visibility in Class I areas that is caused by man-made pollution. The EPA promulgated the Regional Haze Rule in order to meet this goal. Visibility is a measure of not only how far one can see, but how well one can see important characteristics of the landscape such as form, color, geologic features, and texture. Visibility impairment is caused by the scattering of light by gases and particles in the atmosphere. Man-made pollution results in the addition of very small particles to the atmosphere, resulting in haze. A monitoring network was established by the Interagency Monitoring of Protected Visual Environments (IMPROVE) program to measure atmospheric particulate concentrations near Class I areas. The Regional Haze Rule requires states to develop and implement plans to improve visibility in Class I areas in order to achieve "natural" visibility levels within a 60-year period.

Air pollutants that may cause cancer or other harmful effects such as birth defects are classified as hazardous air pollutants (HAPS). EPA is required to control emissions of 187 such hazardous air pollutants. Examples of hazardous air pollutants include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries (http://www.epa.gov/ttn/atw/pollsour.html). EPA has issued rules requiring that facilities belonging to 96 different classes meeting emissions standards for hazardous air pollutants in order to reduce these emissions. Hazardous air pollution emissions standards can be found on the EPA's web site (http://www.epa.gov/ttn/atw/mactfnlalph.html) as well as information on progress that has been made on reducing toxic emissions (http://www.epa.gov/ttn/atw/allabout.html#progress).

Physical Environment

The West Elk Mine is located in Section 16, Township 13 South, Range 90 West, one mile east of Somerset on State Highway 133, in Gunnison County, Colorado. The mine has been operating for 29 years and holds about 14,395 acres of federal coal leases and 3656 acres of fee coal lands. Surface facilities include office, warehouse, shop, and coal handling facilities, and are located about 6 miles north of the proposed modifications. These existing facilities would also be used for mining the proposed lease modification areas.

Somerset Colorado is located in the North Fork Gunnison River Valley and rests at approximately 6,040 feet above sea level. The area is rural, has mountainous terrain, and supports a population of approximately 526 residents (2010 US Census). The normal temperatures (minimum and maximum) for the area range from 14.7 to 38.5 ˚F in January to 56.7 to 90.1 ˚F in July. The average annual precipitation amounts to approximately 15.07 inches, which according to historical records is relatively evenly distributed throughout the year. Average annual wind resultants are generally from the southeast at a speed of approximately 7.1 mph. The area enjoys sunshine for approximately 70% of the time and has an annual average sky cover of around 52%.

Air quality in the area is generally good. Areas that meet federal ambient air quality standards are classified as being in attainment, while areas not meeting standards are classified as being in nonattainment. Currently there is only one nonattainment area in Colorado for ozone that includes part or all of Denver, Adams, Arapahoe, Boulder, Broomfield, Douglas, Jefferson, Larimer, and Weld counties (roughly the Denver-Boulder-Greeley-Fort Collins metropolitan areas). This area is located along the Front Range approximately 110 miles to the east of the West Elk Mine. The Denver nonattainment area was designated by EPA in 2007 and is based upon the 1997 ozone standard. The ozone standard was revised in 2008, but EPA has not issued new nonattainment designations

based upon that standard as of April 2012. EPA has not identified any current nonattainment areas in Colorado for any of the other criteria pollutants.

Colorado maintains a network of monitors that track compliance with ambient air quality standards. Most of the monitors are located in the eastern half of the state, particularly along the more urban Front Range. Western Colorado, by comparison, is relatively sparsely populated, and there are no monitors in the immediate vicinity of the West Elk Mine. There are, however, monitors in some areas of western Colorado, particularly Grand Junction. Table 3.3c shows the maximum monitored values by county for selected locations in the western portion of the state for 2009-2011. Not every county has monitoring, and counties that do have monitors do not necessarily have monitoring for all criteria pollutants. While these monitors cannot provide information regarding air quality in the immediate vicinity of the mine, they do provide insight into regional air quality conditions. There are no SO_2 monitors located in the selected counties. The table indicates exceedances of the $PM_{2.5}$ 24-hour standard in Mesa County for 2009 and 2010, but the 3-year average value ending in 2011 indicates that the 24-hour standard was met. The Mesa County monitor is located in Grand Junction, approximately 61 miles from the West Elk Mine. One ozone exceedance occurred in 2011 in La Plata County at a monitor located roughly 110 miles from the West Elk mine. No other exceedances of ambient air quality standards are noted in the table. An exceedance occurs whenever an individual measurement is recorded that is above the level of the standard, but as the standards are generally defined as an average of several values, an individual exceedance does not necessarily indicate a violation of an ambient air quality standard. None of the listed monitors indicates a violation of any ambient air quality standard.

Table 3.3c. Air Pollutant Monitoring Results for Selected Counties in Western Colorado.

County	CO 2nd Max 1-hr (ppm)	CO 2nd Max 8-hr (ppm)	NO_2 98th Percentile 1-hr (ppb)	Ozone 2nd Max 1-hr (ppm)	Ozone 4th Max 8-hr (ppm)	$PM_{2.5}$ 98th Percentile 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Weighted Mean 24-hr ($\mu g/m^3$)	PM_{10} 2nd Max 24-hr ($\mu g/m^3$)	PM_{10} Mean 24-hr ($\mu g/m^3$)
2009									
Delta								58	25
Garfield				0.07	0.062			71	25
Gunnison								86	27
La Plata	1.4	0.9	47	0.08	0.071	12	4.4	40	20
Mesa	2.3	2.2		0.07	0.064	41	9.6	122	31
Montezuma				0.08	0.069	15	6.8		
San Miguel								72	18
2010									
Delta								115	23
Garfield				0.07	0.066			55	26
Gunnison								92	24
La Plata	1.2	0.7	39	0.08	0.074	11	4.3	88	21
Mesa	1.7	1.1		0.08	0.068	37	9	131	28
Montezuma				0.08	0.066	13	6	.	.
San Miguel								52	15
2011									
Delta								48	21
Garfield				0.07	0.066			73	21
Gunnison				0.07	0.064			74	24
La Plata	1.3	0.7	38	0.08	0.077	12	4.5	50	18
Mesa	1.8	1.1		0.08	0.068	22	7.1	54	25
Montezuma				0.08	0.071	15	6.1		
San Miguel								61	16

Source: http://www.epa.gov/airdata/ad_rep_con.html

In addition to the state monitors, the EPA maintains a network of rural monitors known as the Clean Air Status and Trends Network (CASTNET). The closest CASTNET monitor is located in Gothic, Colorado, near the West Elk Wilderness approximately 25 miles east of the West Elk Mine. This is the closest ozone monitor to the mine and it has collected ozone data since 1989. The latest available 3-year average of the annual 4th-highest 8-hour ozone concentration (through 2010) was 67 ppb, and the highest value of this statistic since 1991 (the first year it was possible to calculate a 3-year average) was 71 ppb, indicating compliance with the ozone ambient air quality standard.

The closest Class I areas to the mine are the Black Canyon of the Gunnison National Park, roughly 24 miles away, and the West Elk Wilderness, which is about 6 miles from the mine. The State of Colorado prepared a state implementation plan for visibility as required under the EPA's Regional Haze Rule that documents the steps the state will take in order to meet the national goal of achieving natural visibility conditions in its Class I areas by 2064. The state examined the West Elk Mine's emissions due to its proximity to the West Elk Wilderness and concluded that it would not have a significant impact on visibility in the wilderness. For this reason the state determined that, in this planning period, it would not be necessary to require additional emissions controls on the mine to meet the visibility goals for the wilderness. (*Colorado Visibility and Regional Haze State Implementation Plan for the Twelve Mandatory Class I Federal Areas in Colorado*, Colorado Air Pollution Control Division, January 7, 2011, http://www.cdphe.state.co.us/ap/regionalhaze.html.)

The plan also included the results of detailed modeling analyses that examined the impacts of regional emissions sources, including those in Colorado, to visibility in all Class I areas in the state. The state developed emissions inventories that examined current emissions (as of 2002) as well as projected emissions through 2018 to evaluate the progress that would be made by 2018 toward the visibility goal. The inventories used in the modeling analysis included the emissions from the West Elk Mine at its permitted rate (as of 2002)[1] and projected using economic growth analyses. The plan was accompanied by individual technical support documents that examined impacts to each of the Class I areas in detail, including the West Elk Wilderness and Black Canyon of the Gunnison. The state will re-examine visibility progress in five year intervals and determine whether additional steps are needed to meet visibility progress goals. Because the annual coal processing rate under any alternative will not exceed the rates analyzed in Colorado's study, no additional visibility analysis was conducted for this EIS.

Air pollutants can be deposited through precipitation (such as rain or snow) or by dry settling processes to surfaces on the ground such as soils and water bodies. Deposition of some types of pollutants, particularly nitrogen and sulfur compounds (e.g., nitrate and sulfate), can lead to acidification of lakes and streams. Acidification of surface waters can negatively affect aquatic organisms such as zooplankton, algae, diatoms, invertebrates, amphibians, and fish. Nitrogen can cause other ecosystem impacts by fertilizing both soils and water. These excess inputs of nitrogen can disrupt the natural flora and fauna by allowing certain species that would not naturally occur in abundance to out-compete those that thrive in pristine nitrogen-limited systems. The end result is an unnatural shift in species composition for sensitive species, which may have a subsequent impact on other components of the ecosystem.

The chemistry of wet precipitation (rain and snow) is monitored by the National Atmospheric Deposition Program (NADP), an interagency organization that maintains a network of samplers located across the country. The nearest NADP monitor to the West Elk Mine is located near Gothic, approximately 25 miles to the east of the mine. Figures 1 and 2 show trend plots of nitrate and sulfate concentrations in wet deposition as measured by the Gothic NADP wet deposition monitor. As indicated on the plots, some years (2006, 2008, 2009, 2010) did not meet the NADP program's completeness criteria, but the trends suggest that concentrations of nitrate and sulfate have decreased somewhat since monitoring began in 1999. Figure 3 shows trends in inorganic wet nitrogen (N) deposition (where the amount of nitrogen is the sum of nitrogen from nitrate and ammonium in wet deposition). It is important to note that measured wet deposition (as opposed to the concentration of a substance in precipitation) is influenced by the amount of precipitation that occurs, and thus the trend in nitrogen deposition may not reflect trends in the amount of a substance that is present in the atmosphere. However, the plot does show that for years with complete data the deposition of nitrogen at Gothic varied from approximately 1 to 1.5 kilograms per hectare. The National Park Service has set a critical load for nitrogen deposition for Rocky Mountain National Park, located in the Front Range northwest of Denver, of 1.5 kilograms per hectare per year (http://www.nature.nps.gov/air/Studies/criticalloads/criticalLoadExplain.cfm). A critical load is a level of deposition

[1] The mine's 2002 permitted emissions rate was at least as high as the current permitted rate (as stated in its 2010 construction permit).

below which significant harmful ecosystem effects are not known to occur. As the mountainous terrain and sensitive alpine areas found near Gothic (such as the West Elk Wilderness) are similar to those found in Rocky Mountain, this suggests that present levels of nitrogen deposition are not likely to be a problem in the area. No critical load for sulfur deposition has been established by a federal land manager in Colorado.

Figure 3.3a. Annual trends in nitrate (NO3) concentrations in wet deposition collected by the Gothic, Colorado (CO10) National Atmospheric Deposition Program monitor.

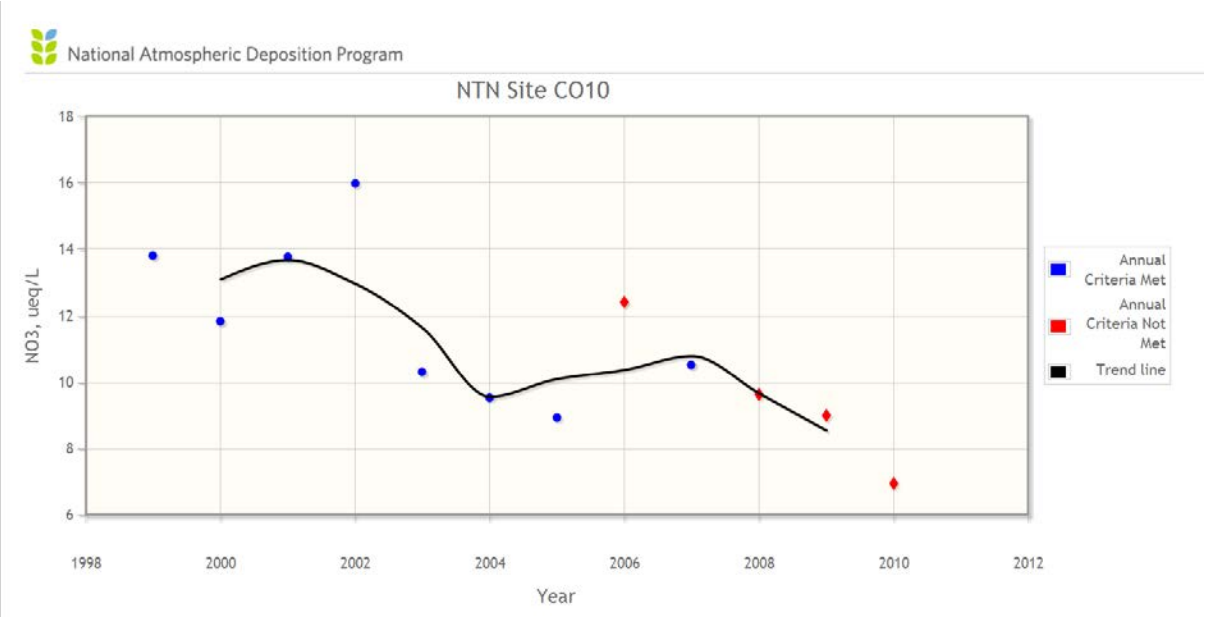


Figure 3.3b. Annual trends in sulfate (SO_4) concentrations in wet deposition collected by the Gothic, Colorado (CO10) National Atmospheric Deposition Program monitor.

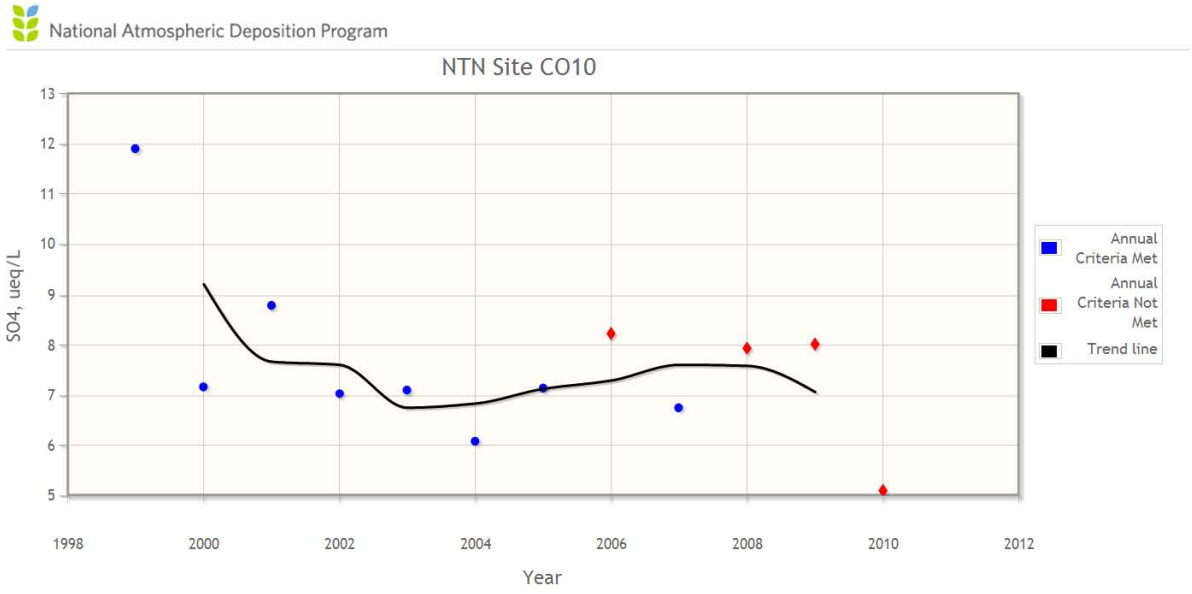
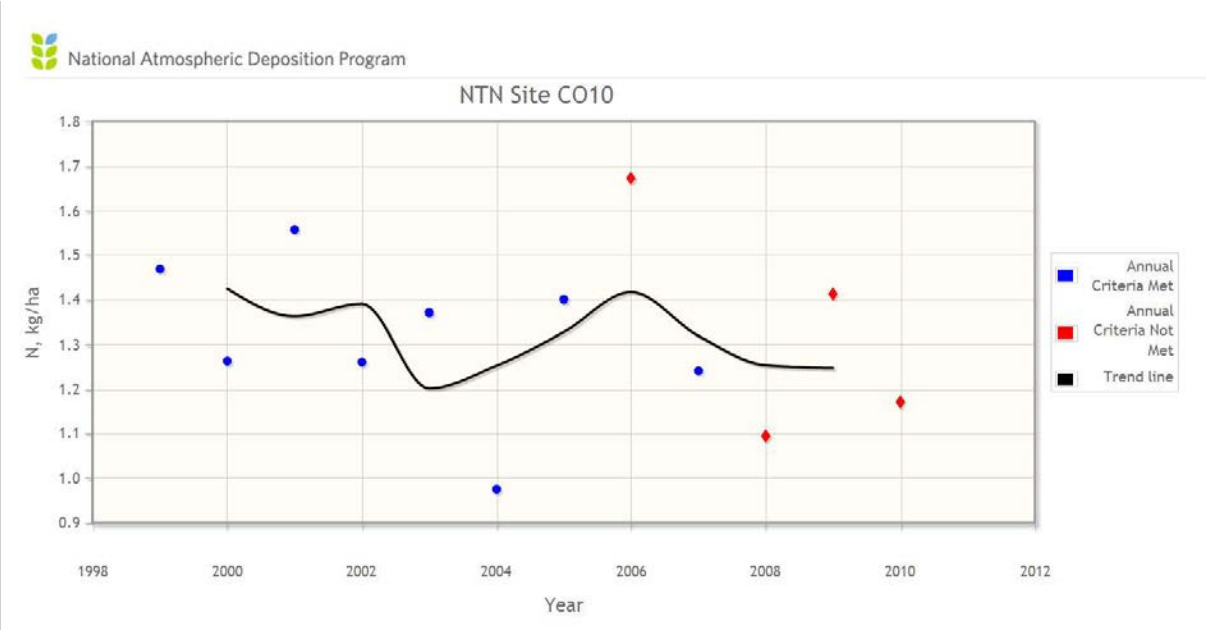


Figure 3.3c. Annual trends in nitrogen (N) wet deposition as measured by the Gothic, Colorado (CO10) National Atmospheric Deposition Program monitor.



Plot notes (applicable to Figures 1-3):
The annual weighted mean concentrations and depositions are characterized as meeting or not meeting the NADP's data completeness criteria for the 1-year period.
1.Valid samples for 75% of the time period
2.Valid samples for 90% of the precipitation amount
3. Precipitation amounts for 75 % of the time period
Trend line
The trend line is a smoothed 3-year moving average with a one-year time step. The line is only displayed where the minimum data completeness criteria is met for the 3-year period.
Source: http://nadp.sws.uiuc.edu/sites/siteinfo.asp?net=NTN&id=CO10

Emissions of air pollutants in the region surrounding the mine result from industrial sources, smoke from prescribed and wildfire, mobile sources such as trains and vehicles, off-road vehicles, wind-blown dust from areas of exposed soil such as fields and unpaved roads, road construction, and other activities. State emissions data for Gunnison and Delta counties for 2008 are given in Table 3.3d below.

Table 3.3d. 2008 Emissions Inventory by Source Category for Gunnison and Delta Counties, Colorado, in tons.

Source	*Delta County*						*Gunnison County*					
	Benzene	**CO**	**NO2**	**PM10**	**SO2**	**VOC**	**Benzene**	**CO**	**NO2**	**PM10**	**SO2**	**VOC**
Agricultural Tilling				270.88						0.79		
Aircraft	0.65	288.03	1.56	5.67	0.24	27.07	0.22	121.58	4.17	2.33	0.48	9.39
Biogenic		2040.81	232.53			16546.90		2681.08	192.99			20474.30
Combustion	0.00	231.14	47.37	5.12	15.18	9.91	0.00	29.73	19.55	0.62	1.82	1.81
Construction				367.98						400.97		
Forest and Agricultural Fires	4.62	1051.06	34.90	130.29	7.88	61.39	16.42	3389.85	89.51	469.02	28.64	218.40
Non Road	7.22	1206.47	248.62	27.57	0.77	270.94	16.57	2097.71	275.42	39.32	0.84	664.81
Oil Gas Area		4.97	0.11	0.00		0.57		23.23	20.36	2.21	0.44	54.92
Oil Gas Point							2.81	131.56	147.24	0.97	0.07	84.79
Pesticides						27.52						13.48
Point Source	0.13	0.86	6.09	378.17	0.19	17.27	1.10	38.06	36.05	215.46	0.92	60.71
Portables	0.03					10.49	0.05					15.03
Railroad	0.02	22.14	224.75	5.58	12.80	8.37	0.01	8.22	83.43	2.07	4.75	3.11
Refueling	0.15					14.55	0.11					10.77
Restaurants	0.13	2.94	0.02	7.93	0.02	7.33	0.06	1.44	0.01	3.88	0.01	3.59
Road Dust				961.00						1229.75		
Solvents						116.38						57.25
Structure Fires		1.91	0.04	0.34		0.35		0.93	0.02	0.17		0.17
Surface Coating						89.46						52.22
Tank Trucks	0.00					0.33	0.00					0.29
Vehicles	14.53	5027.39	745.32	30.95	5.80	461.62	11.49	3830.83	537.35	21.50	3.95	365.69
Wood burning	18.52	2254.55	30.50	312.36	4.73	435.96	9.17	1115.69	15.09	154.58	2.34	215.74
Total	**46.00**	**12,132.27**	**1,571.84**	**2,503.85**	**47.61**	**18,106.41**	**58.01**	**13,469.91**	**1,421.20**	**2,543.65**	**44.28**	**22,306.46**

(Source: http://www.colorado.gov/airquality/inv_maps_2008.aspx)

Alternative 1 Environmental Effects

It is anticipated that mining operations will continue on existing leases even if the two leases modifications under consideration in this analysis are not granted under the proposed action. The mine life is currently projected for an additional 11-12 years on existing federal coal reserves, with perhaps as much as an additional 2 years on non-federal minerals (fee reserves). The mine currently employs longwall equipment and methods for extracting the underground coal. This practice would continue under the modified leases. Additionally, other activities currently authorized at the site including coal processing and venting of gases would also continue in accordance with the permits and site operations plans that are currently active. The proposed lease modification thus represents a continuation of the existing activity occurring at the mine location, and will not increase the intensity of operations above currently evaluated levels (there is no proposed change in the rate of coal extraction under any alternative). It is therefore possible to infer impacts to air quality due to future mining operations from current conditions.

For purposes of this discussion, emission sources at the West Elk Mine are grouped into three general categories:

1. stationary sources;
2. mobile sources located below ground and above ground at the mine complex; and
3. MDW-related emissions: mobile source, construction, methane, and fugitive dust emissions that result from drilling, operating, and servicing methane drainage wells, constructing well pads, and construction of roads used to access the drainage wells.

These emission sources are discussed below.

Most emissions of criteria pollutants resulting from stationary sources at the mine are in the form of particulate matter. Sources of particulate matter at the mine include various coal handling equipment such as conveyors and transfers, coal storage silos and feeders, coal storage and refuse piles, coal mine ventilation shafts, a coal preparation plant, an emergency generator, miscellaneous exempt [2] sources such as heating equipment, auxiliary generators, and fuel storage tanks, and coal hauling operations. The mine has a permit for PM_{10} emissions issued by the state in 2010 (Construction Permit 09GU1382, issued June 18, 2010). This permit limits the emissions of particulate matter by limiting the total amount of coal that can be processed in a year to 8.5 million tons of coal per year. The permit also limits the sizes of different coal stockpiles that are allowed, the hours of operation of various maintenance activities, the total quantity of refuse material from the coal preparation plant and the and the amount of coal that can be processed by the coal preparation plant. The permit limits the total PM_{10} emissions for the mine's stationary sources to 88.2 tons per year. This classifies the mine as a minor source for particulate matter, as the threshold for major sources is 250 tons per year. The permit also contains a requirement for the operator to follow a fugitive dust control plan that is attached to the permit. The plan applies to coal handling equipment such as conveyors, coal processing equipment, storage silos, storage piles, hauling acitivies, mine ventiliation shafts, and coal preparation plant processing equipment. In addition to the requirements in the construction permit, the Colorado Division of Reclamation, Mining, and Safety (CDRMS) Mining and Reclamation plan includes general air pollution control requirements. These include applying water to any active unpaved roadways, parking areas, and refuse disposal area to control dust emissions from these areas, if required, on a seasonal basis, and compacting and spraying of coal stockpiles when necessary to eliminate particulate emissions created during coal handling. In addition to regular watering (sprinkling) of the regularly travelled gravel roads on the mine site, these roads are treated at least once a year with magnesium chloride for dust suppression.

At the time the permit request was submitted, the state did not require reporting for $PM_{2.5}$ in accordance with the EPA's surrogate policy. This policy allowed states to use PM_{10} emissions as a surrogate for $PM_{2.5}$ due to technical difficulties that existed in analyzing $PM_{2.5}$ emissions (http://www.epa.gov/NSR/documents/20100204repealfs.pdf). As a result, the permit does not contain emissions limits for $PM_{2.5}$. There are no emissions from stationary sources at the mine of other criteria pollutants above minor source permitting thresholds and therefore the permit does not contain limits for criteria pollutants other than particulate matter.

The application for the 2010 permit was accompanied by a dispersion modeling analysis (*PM-10 Dispersion Modeling Study, Coal Prep Plant Modification, West Elk Mine: Gunnison County, Colorado*, prepared by Air

[2] Certain types of sources are specifically exempted from permitting by the State of Colorado under Regulation 3 (http://www.cdphe.state.co.us/ap/conperm.html).

Resource Specialists, Inc., February 25, 2010). This analysis was completed to support the mine's permit modification request, which included a proposal to build the coal preparation plant mentioned above. The analysis examined the potential particulate matter emissions that would occur from the new facility, as well as other facilities at the mine. The dispersion modeling analysis also included sources from the nearby Oxbow Mine, and included a background particulate matter concentration to account for other sources of particulate matter not associated with either mine. The analysis estimated the maximum direct impact to PM_{10} concentrations due to the West Elk and Oxbow mines, as well as the resulting ambient air concentrations due to other sources (i.e., the two mines plus the background). The analysis used conservative assumptions in order to ensure that the analysis would not underestimate the particulate matter emissions. The results are shown in Table 3.3e. The maximum predicted concentration of PM_{10} due to the mines and other background sources was 148 $\mu g/m^3$, which is below the primary ambient air quality standard. These results indicate that the area around the mine can be expected to remain within ambient air quality standards for $PM_{10.}$

Table 3.3e. Maximum Predicted PM_{10} Impacts Due to West Elk Mine and Oxbow Mines

Averaging Period	PM10 Model Predicted Impact Due to Mining ($\mu g/m^3$)	Back-Ground ($\mu g/m^3$)	Total Pm-10 Impact ($\mu g/m^3$)	Primary National Ambient Air Quality Standard ($\mu g/m^3$)
24-Hour Average (1st Highest)	118.89	29.0	147.89	150
Annual Average (1st Highest)	16.99	16.0	32.99	50

The mine is required to periodically submit an air pollution emission notice (APEN) with updated emissions information. The APEN included actual particulate matter emissions (both PM_{10} and $PM_{2.5}$) due to mine operations for 2010. The particulate matter emissions were determined by applying emissions factors to the actual coal production for the year. An emissions factor is a number that estimates emissions of a pollutant from an air pollution source for each unit of activity, such as an hour of operation, a vehicle mile traveled, or a ton of coal produced. The actual values for the particulate matter emissions are presented in Table 3.3f. The table demonstrates that the actual particulate matter emissions in 2010 were within the permitted limits. Coal production for 2010 was also below permitted limits, at 4.8 million tons of coal.

Table 3.3f. West Elk Stationary Source Particulate Emissions Reported by Air Pollution Emissions Notice for 2010.

	2010 Emissions (tons)	
Emissions Source	PM10	PM2.5
Coal processing operations	77.8535	40.1705

In addition to the particulate matter emissions sources discussed above, there is one permitted stationary source at the mine that has the potential to emit SO_2, NO_2, CO, and volatile organic compounds as well as particulate matter. This source is an emergency generator that was installed in 2010. This generator is limited by the state permit to no more than 500 hours of operation per year. The last APEN, submitted in 2010, contained estimated maximum potential emissions due to the operation of the generator. Additional stationary source emissions for the permitted emergency generator, as well as two exempt (unpermitted) generators, are listed in Table 3.3g. Table 3.3g also lists emissions for miscellaneous exempt heating equipment and a diesel storage tank located at the mine.

In addition to the stationary sources there are mobile sources of emissions that are not permitted by the state. These mobile sources include above ground and underground mining equipment. Because a detailed listing of all pieces of equipment, along with important characteristics of the equipment such as age and horsepower, is not available, an exact calculation of emissions from mobile source equipment at the mine cannot be determined. In lieu of this information the BLM used the EPA's NONROAD 2008a model (http://www.epa.gov/otaq/nonrdmdl.htm) to estimate the maximum potential emissions from mobile sources located at the mine based upon the amount of diesel fuel used and its average carbon content. The model takes into account the average temperature and

elevation of the area being analyzed. The BLM assigned the mobile sources to specific source categories applicable to underground and surface mining operations and applicable to the counties in which the mine is located. The analysis assumes uncontrolled emissions and therefore provides a conservative estimate of the maximum potential for emissions from the mobile sources at the mine based upon the quantity of diesel fuel used at the mine in 2011. (For further details on how the analysis was performed, see Appendix A.) The resulting estimates are presented in Table 3.3g.

Table 3.3g. Estimated Stationary and Mobile Source Emissions for Equipment Located at the Mine (in tons).

Mobile Sources[1]	Particulate Matter		Non-methane Organic Gas **NMOG**	Carbon Monoxide **CO**	Nitrogen Oxides ($NO+NO_2$) **NO_X**	Sulfur Dioxide **SO_2**	Carbon Dioxide **CO_2**	Methane **CH_4**	Nitrous Oxide **N_2O**
	PM_{10}	**$PM_{2.5}$**							
Underground Mining Equipment	12.64	12.26	19.37	74.77	88.82	1.21	5,613.98	0.29	0.14
Surface Mining Equipment	1.90	1.84	2.31	12.27	26.24	0.41	1,908.74	0.04	0.05
Stationary Sources									
Diesel Storage Tank[2]			1.99						
Emergency Generators[3]	0.39	0.39	0.66	5.03	10.34	0.13	1,007.47	0.05	
Heating Equipment[2]	4.30	4.36	2.41	35.70	43.88	0.59	51,920.29	0.97	
Total	19.23	18.85	26.74	127.77	169.28	2.34	60,450.48	1.35	0.19

[1] Mobile sources emissions are for exhaust only.
[2] These are exempt sources.
[3] Includes emissions from three generators, one that is permitted (permit 10GU1130) and two that are exempt

The final emissions group includes emissions from the construction and operation of methane drainage wells. Although it is not a criteria pollutant, methane is a greenhouse gas, approximately 21 times more effective than carbon dioxide in terms of its warming potential. Methane is created during the process of coal formation and remains stored in the coal seams and surrounding rock layers. Shallow coal seams, such as those mined via surface mining operations, contain less methane because there is less pressure due to the overburden (i.e., the rock and soil lying on top of the seam) to keep the methane from escaping. Methane is released to the atmosphere when a coal seam is fractured during surface or underground mining. The amount of methane released by mining depends on the carbon content of the coal, the depth of the coal seam (deeper seams generally contain more methane), and the type of mining being conducted. As mining operations progress into different areas of the mine, it is necessary to vent accumulated methane to the atmosphere to prevent concentrations from building up to levels that could result in underground explosions. The main mine ventilation air system serves this purpose but may become inundated with high concentrations of methane[3]; therefore, the mining company drills additional methane ventilation wells to allow methane from the area being mined to be vented to the atmosphere.

Methane is vented from coal mines because it is explosive above 5% concentration (http://www.epa.gov/cmop/faq.html, & Canadian Center for Occupational Health and Safety, 2011). The primary environmental concern over methane venting is its contribution to global greenhouse gas emissions. . For a general discussion of greenhouse gases and climate change, see the section on Cumulative Effects and Climate Change below.

As methane escapes the enclosed space of the mine through vent shafts and vent wells, the gas is rapidly dispersed and diluted with ambient air. Methane vented from the mine is not expected to affect the local environment because it is considered biologically inert (Committee on Toxicology, Board on Toxicology and Environmental Health Hazards, Commission on Life Sciences, National Research Council, 1984). Methane acts as a simple asphyxiant in very high concentrations, displacing oxygen (Committee on Toxicology, Board on Toxicology and Environmental Health Hazards, Commission on Life Sciences, National Research Council, 1984). Methane vented to the atmosphere is effectively diluted, removing any concern of oxygen displacement for respiratory animals. Methane is nontoxic to plants at normal concentrations. (Personal communication, Jeff Sorkin and Dr. Robert Musselman, Plant Physiologist, Rocky Mountain Research Station, April, 16th, 2012)

The amount of methane released by the West Elk Mine has varied considerably over the life of the mine, and is not well correlated with production levels. In general, the amount of methane released has decreased as the mining operations have progressed into a shallower seam, but there is no clear relationship that would make it possible to accurately predict the amount of methane that will be released to the atmosphere during future mining operations. However, during the period from July 2010 through June 2011 the methane released from the West Elk Mine (including methane from drainage wells and ventilation air) was approximately 58,663 tons. In terms of carbon dioxide equivalents, the warming potential of this quantity of methane in the atmosphere is approximately equal to that of 1,231,923 tons of carbon dioxide (http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results).

There are some technologies for mitigating release of methane from coal mines that can be used under some circumstances. In 2009 the BLM Colorado State Office, Deputy State Director, Energy, Lands, and Minerals requested that Mountain Coal Company prepare an economic evaluation report to supplement their existing Resource Recovery and Protection Plan report to address coal mine methane management options at the West Elk Mine[4]. To support an independent analysis of alternatives for methane management, the company retained several consultants to address the options discussed. Several potential technologies that might be used to mitigate methane releases were examined in the report. The results are discussed below.

Flaring the ventilation air methane (i.e., methane vented via the main mine ventilation system) does not appear to be a technologically feasible option due to the high volume of air flow and dilute concentrations of methane. Any option to control ventilation air methane through flaring would result in additional undesirable air impacts from the combustion of make-up fuel that would need to be added to fully oxidize methane within the VAM stream.

A detailed assessment of the capture and centralized collection of methane drainage well (MDW) methane was included. The report also included an analysis of the potential for flaring methane from the drainage wells. The

[3] Methane emitted from the main mine ventilation system is known as ventilation air methane, or VAM.
[4] *West Elk E-Seam Gas Economic Evaluation Report*, Mountain Coal Company, LLC, September 24, 2009.

overall assessment indicated that the costs for the project, additional potential environmental impacts, regulatory concerns, and the safety considerations below, do not warrant additional detailed analysis at this time. Although flaring may reduce the global greenhouse gas burden, the flaring option is potentially the least desirable methane mitigation option based upon both and environmental and economic efficiency concerns.

The use of flaring to reduce the effects of greenhouse gases on climate change would also have to be approved by the Mine Safety and Health Administration (MSHA), which has the regulatory authority to approve proposed flaring systems intended for use at coal mines in the U.S. The MSHA would need to conduct a thorough review of the proposed flaring system in order to establish the requirements for the system. Currently there are no flaring operations or proposed test operations at active coal mines in the United States. It is not likely that a thorough review, and approval, would occur prior to the development and operation of the mine expansion. If flaring was approved an environmental review would be addressed in a modification to the mine operations permitting.

Another potential methane emission reduction strategy would be to reduce the potential greenhouse gas emissions of the project through methane capture. With respect to the ventilation air methane, no technology currently exists or has been demonstrated to have the capability of handling the volume of ventilation air and dilute concentrations of methane at the West Elk mine to make capture economically feasible. In 2009 the Department of Energy (DOE) released the results of a study to simulate ventilation air methane capture using a non-producing mine (U.S. Department of Energy Cooperative Agreement DE-FC26-02NT41620, at http://www.epa.gov/cmop/docs/vam_executive-summary.pdf). The project demonstrated continued advancements and a viable solution for coal mine ventilation air methane control. However, according to the study the "system is only economically feasible when there is value for greenhouse gas emission reduction", which implies that carbon credits, a cap and trade system, or another market or regulatory based incentivized system (discussed below) for reducing greenhouse gases would be required. There is currently no such system in place in the United States. Non-monetary, voluntary systems exist, but are not specified by regulation and are not tied to permitting, and therefore there is no effective economic incentive. The DOE assessment included carbon credits in their economic feasibility model, which provided a cost basis for controlling ventilation air methane at rates up to 180,000 cubic feet per minute.

The analysis also examined the potential for capturing and/or conditioning the drainage well methane for use on site as fuel for a cogeneration facility (i.e., to produce electricity for sale to the grid) or for sale as pipeline quality natural gas. The study evaluated the gas characteristics and potential quantities of methane that would be realistically produced based on existing well data and testing. This information was then used to engineer a collections system that including options for pipelines, screw compressor configurations for pressure management, dehydration units, control systems, values, and metering. Options for energy generation equipment included reciprocating internal combustion engines (RICE) and combustion turbines. Additional gas processing equipment options for rendering natural gas from the drainage well methane were also presented. The analysis covered multiple scenarios for multiple configurations of equipment. Drainage well methane capture infrastructure would include more miles of road and pipeline construction and surface disturbance than would occur under current operational practices.

For energy production, the RICE proved to be the closest potential candidate for any onsite energy production. The analysis for the production of natural gas from coal mine methane indicated that the levels of contaminants in the gas (including carbon dioxide, oxygen, and nitrogen) were treatable, but that the cost of treatment of the gas, the cost of gas compression, and the distance to access available existing pipeline systems were prohibitive for delivery of the gas as a saleable product. Additionally, the time that it would take to exercise the option would go beyond the timeframe it would take to mine the proposed lease tract. Since this mining project would be an addition to an existing mine, uninterrupted mining would need to take place for this project to be economically viable. For these reasons, methane capture is not a feasible option for mitigation of methane emissions.

Another option for methane emission mitigation would be to use the ventilation air methane. The report provided an assessment of one potential technology, regenerative thermal oxidation (RTO), which could potentially control such dilute levels of ventilation air methane. The technology incorporates adsorption media at the gas inlet to separate out and concentrate the ventilation air methane exhaust to the saturation point of the adsorption media. When fully saturated the media is then regenerated by heating and releasing contaminates from the media, which are fully oxidized via combustion in the process. This process would also require the addition of make-up fuel and would emit non-insignificant quantities of criteria pollutants. While this technology would reduce the global warming potential of the ventilation air emissions (by converting methane to carbon dioxide), it offers no options for energy recovery or use of the resource, and is thus not an economically feasible option for mitigating methane release.

A final option for mitigating the global warming potential associated with the release of methane from the mine would be the purchase of emissions offsets and carbon credits. However, there are currently no markets for these products beyond voluntary markets within the United States and no regulatory framework or incentives (permitting or otherwise) to support a trading system, and thus this is also not a feasible mitigation strategy.

The mine is, however, taking other steps to reduce methane emissions. The mining company is a participant in EPA's Coalbed Methane Outreach Program, which is a voluntary program whose goal is to reduce methane emissions from coal mining activities (http://www.epa.gov/cmop/). By working cooperatively with coal companies and related industries, the program helps to address barriers to using coalbed methane instead of emitting it to the atmosphere. In turn, these actions mitigate climate change, improve mine safety and productivity, and generate revenues and cost savings. The West Elk Mine began recovering methane in 2003 to heat mine ventilation air on site. In 2006, the EPA estimated that the mine recovered and used approximately 170 mmcf of methane, although the exact amount was not measured (*Identifying Opportunities for Methane Recovery at U.S. Coal Mines: Profiles of Selected Gassy Underground Coal Mines 2002-2006*).

In addition to methane, other organic gases are released through methane drainage wells in small amounts. There are very few data regarding the types of gases released through drainage wells other than methane. However, one study that was completed as part of the economic evaluation report discussed above also included an analysis of the concentrations of other constituents emitted through the methane drainage wells. This study sampled the exhaust coming from existing methane drainage wells and performed an analysis to determine its constituents. Two samples were collected and analyzed. Table 3.3h shows the major constituents listed in the report.

Table 3.3h. Analysis of methane drainage well samples.

Gas Component	Concentration Units	Sample ID V18-E1-38 15 May 2009 0851	Sample ID V14-E1-42 15 May 2009 0840
Methane	%	60.7	34.5
Carbon dioxide	%	1.5	2.3
Nitrogen	%	28.9	50.5
Oxygen	%	7.8	11.9
Ethane	%	0.91	0.62
Propane	%	0.177	0.106
i-Butane	%	0.023	0.027
n-Butane	%	0.028	0.023
i-Pentane	%	0.0129	0.0094
n-Pentane	%	0.005	0.0038
Hexane+	%	0.0232	0.007
GHV, dry (14.73 psi)*	Btu/scf	639	366
Relative density *		0.739	0.856
NMHC (Non-Methane Hydrocarbons)	% C	1.376	0.893
	mg/M^3	0.697	0.453
Total sulfur	ppmv	0.65	0.192
	mg/M^3	0.84	2.6
Total organic silicon	ppmv	0.22	0.19
	mg/M^3	0.26	0.23
Total organic chlorine	ppmv	<0.10	<0.10
	mg/M^3	<0.15	<0.15
Total organic fluorine	ppmv	<0.1	<0.1
	mg/M^3	<0.08	<0.08

* Calculation based on 4 major components, 60o F, 14.73 psi ppmv=parts per million by volume mg/M3=milligrams per cubic meter BTU/scf=British Thermal Units per standard cubic foot % C=percent carbon

* Calculation based on 4 major components, 60^{o} F, 14.73 psi			
ppmv=parts per million by volume			
mg/M^3=milligrams per cubic meter			
BTU/scf=British Thermal Units per standard cubic foot			
% C=percent carbon			

Due to the limited number of samples available (two) taken on one individual day (15 May 2009) within a relatively short period of time, it is not known how accurately these values represent average or potential emissions of various non-methane hydrocarbons and other gaseous compounds. As the emissions of methane have proven to be highly variable and not closely related to coal production levels, it is reasonably likely that emissions of other non-methane constituents will be highly variable as well. For this reason no attempt is made here to quantify all non-methane emissions on an annual basis.

There are also emissions associated with the construction of access roads and well pads, and drilling of methane drainage wells. These activities will continue for the remaining lifetime of the mine even if the parcels under consideration are not leased. Under the proposed action, it has been estimated that up to 48 drainage wells may be required over a period of 1.6 years, which corresponds to a rate of 30 per year. It was therefore assumed under this analysis that up to 30 wells and pads might be constructed per year along with 6.5 miles of roads, resulting in a total of 72 acres of disturbance, even under the no action alternative. This is a conservative assumption when compared with historical activities. During 2011, there were just 14 drainage wells constructed at 10 pad locations. Typically 4-6 mine drainage wells are active at any given time. The mining company reclaims well pads and roads when no longer needed. The total, current, actual surface disturbance is approximately 400 acres of more than 17,140 acres in the currently permitted West Elk Mine area (prior to adding the lease modification areas). This figure includes the West Elk Mine's entire site including disturbance on private lands. As of May 2012, 71 acres have been backfilled, graded, and topsoiled. Five acres were reclaimed in 2011.

Given these assumptions, the emissions associated with road construction, well pad construction, and well drilling were estimated using a spreadsheet developed from EPA's document AP 42, *Compilation of Air Pollutant Emission Factors* (http://www.epa.gov/ttnchie1/ap42/), and the EPA NONROAD 2008a model. The construction and drilling of roads and drainage wells is contracted by the mining company, so the exact mix of equipment may vary slightly from the equipment assumed in this analysis. The analysis took into account dust and tailpipe emissions of typical road construction equipment (including a blade, backhoe and roller), one truck mounted drill rig, support vehicles (such as a water truck), and pickup trucks used for well inspection visits. It also included wind erosion of exposed road and well pad surfaces. Average emission factors were taken from AP 42 and conservative estimates were used for the amount of time needed to construct well pads and roads. Well inspection visits were assumed to occur twice daily for a period of one week, and then weekly thereafter, for a total of approximately 30 weeks per year. The analysis did not include any assumptions regarding control of fugitive dust emissions from exposed surfaces on roads or drill pads, although the mining company does water these surfaces periodically to suppress fugitive dust emissions. Actual windblown dust emissions are therefore expected to be less than those assumed in this analysis. Table 3.3i summarizes the estimated well pad and road construction emissions that might be expected per year under these assumptions. Values were rounded to the nearest whole number, resulting in zero values for some types of emissions. It can be seen from the table that the construction-related emissions are relatively small.

Table 3.3i. Total estimated annual emissions from road and drainage well construction and maintenance

Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	HAPs	CO_2	CH_4	N_2O	CO_{2eq}	CO_{2eq} metric Tonnes
Well Pad and Road Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	0	0	1	0	0	0	0	153	0	0	153	139
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	1	0	0	0	0	0	0	3	0	0	3	3
Sub-total: Construction	**16**	**2**	**1**	**0**	**0**	**0**	**0**	**155**	**0**	**0**	**156**	**142**
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	5	0	0	5	5
Sub-total: Operations	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**5**	**5**
Total Emissions	**18**	**2**	**1**	**0**	**1**	**0**	**0**	**160**	**0**	**0**	**161**	**146**

Notes
HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1
CH_4 = methane
CO_2eq=carbon dioxide equivalents
NO_x=nitrogen oxides ($NO+NO_2$)

By comparing the reported and estimated emissions in Tables 3.3f, 3.3g and 3.3i, it is apparent that emissions of criteria pollutants are relatively small in comparison with local emissions in Gunnison and Delta counties presented in Table 3.3d. Emissions in these counties as a whole are not high, as they are rural counties and are relatively sparsely populated. Emissions of ozone precursors, volatile organic compounds and nitrogen oxides (NO and NO_2), are also low. Furthermore, mining operations are presently occurring at rates representative of those expected under the no-action and proposed action alternatives. Although there are few monitors close to the mine, there is no indication from available data that any violations of ambient air quality are occurring in the mine's vicinity. It is therefore not anticipated that continued mining operations expected under any alternative will have any appreciable effect on criteria pollutant levels in the analysis area. For purposes of this analysis, the levels of emissions discussed in previous sections do not warrant further dispersion modeling to assess impacts to criteria pollutants or photochemical modeling analysis to assess impacts from ozone. As noted earlier, ozone formation is a complex non-linear process and cannot be analyzed without taking into account all emissions sources in an area that may have an impact on the area near the mine. Modeling of ozone formation requires a complex photochemical model that is much more time and resource intensive than a dispersion model. Further modeling of the mine's emissions under these circumstances is highly unlikely to yield any significant impacts to atmospheric pollutant concentrations.

Emissions of greenhouse gases, including methane, carbon dioxide, and nitrous oxide (N_2O) are listed in Tables 3.3f, 3.3g and 3.3i. In addition to the figures in these tables, additional emissions of methane from drainage wells were presented in the discussion above. Due to the highly variable nature of the methane emissions from the mine, the figure presented earlier provides only a rough estimate of potential annual methane emissions. Actual methane emissions from future mining activities cannot be accurately predicted. Greenhouse gases, particularly carbon dioxide and nitrous oxide, have the potential to remain in the atmosphere for long periods of time (from tens to hundreds of years) and travel long distances. Their effects are thus widely distributed, rather than localized to the analysis area around the mine, and need to be placed in context with similar emissions on a much larger spatial scale.

For comparison, in 2010 the U.S. emissions of CO_2 (including some natural sources) amounted to roughly 6.3 billion tons, emissions of methane totaled approximately 734 million tons in CO_2 equivalents, and emissions of N_2O totaled roughly 337 million tons in CO_2 equivalents. Total U.S. emissions of greenhouse gases in CO_2 equivalents (including other greenhouse gases) was approximately 7.5 billion tons. When carbon sinks (i.e., losses of carbon from the atmosphere due to processes such as uptake by plants) are considered, net U.S. greenhouse gas emissions to the atmosphere were approximately 6.3 billion tons in CO_2 equivalents. During the same year, gross greenhouse gases emitted in Colorado totaled roughly 142 million tons in CO_2 equivalents, and net emissions (after subtracting carbon sinks) were roughly 113 million tons in CO_2 equivalents. (*Final Colorado Greenhouse Gas Inventory and Reference Case Projection*s 1990-2020, EPA 430-R-12-001 *Inventory of U.S. Greenhouse Gas Emissions and Sinks*: 1990 – 2010, April 15, 2012)

On June 20, 2010, Environmental Protection Agency promulgated a rule known as the Tailoring Rule that subjects some greenhouse gas emitting facilities to permitting under the Clean Air Act. This rule initially focuses on the largest emitting facilities. In order to determine whether the tailoring rule will apply to a facility the permitting authority will need to apply a detailed set of criteria. For this mine, the applicable permitting authority will be the State of Colorado. As of this writing (May 2012), the state has not yet reached a determination as to whether or not the mine will be subject to permitting of its greenhouse gas emissions under the Tailoring Rule. If the state decides that the rule applies to the West Elk Mine, the mine will need to obtain an additional permit for its greenhouse gas emissions and comply with any restrictions listed on the permit. If the USFS receives any additional information prior to publication of the FEIS that indicates the Tailoring Rule will apply to the mine and thus additional permits will be required, this information will be disclosed in the final document.

Indirect Impacts

Mined coal will be transported by rail to various facilities. Transportation by train will result in emissions of pollutants such as carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter, and volatile organic compounds. Locomotive emissions will also include greenhouse gases such as carbon dioxide. Coal will then be combusted by the destination facilities in order to provide energy for various purposes, principally electricity generation. The types and locations of facilities cannot be determined in advance, and thus there is no way to make reasonable estimates of the amounts of coal that will be burned in any particular facility, or the types and efficiencies of emissions controls that may be present at the destination facility (if any are present). It would therefore be highly speculative to attempt to quantify amounts of greenhouse gases and pollutants that might be emitted when the coal is combusted. In general, it is reasonable to assume that coal combustion will result in

emissions of pollutants including sulfur dioxide, nitrogen oxides, volatile organic compounds, particulate matter, sulfuric acid, and mercury. It is also likely that coal combustion-related emissions will contribute to atmospheric concentrations of ozone and secondary particulates when the proper atmospheric conditions are present. Coal combustion will also lead to the emissions of greenhouse gases, principally carbon dioxide. Most facilities that consume coal do not yet have controls to limit the quantities of greenhouse gases emitted to the atmosphere. The amount of carbon dioxide produced will depend on the carbon content of the coal and the degree to which complete combustion is achieved. In general, assuming complete combustion, 1 pound of carbon combines with 2.667 pounds of oxygen to produce 3.667 pounds of carbon dioxide (http://www.eia.gov/coal/production/quarterly/co2_article/co2.html). Without the ability to know the facilities in which the coal will be burned, however, it is too speculative to attempt to quantify total greenhouse gas emissions that will result from burning the coal that will be extracted from the mine under any of the alternatives.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those related to air emissions. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases were developed, the effects would be similar to Alternative 3. Under Alternative 2, the mining could continue for an additional 1.6 years and additional methane drainage wells would need to be constructed. However, under Alternative 2, the construction of approximately 6.5 miles of roads that would be used to access wells located in a roadless area would not be permitted and the emissions associated with building the roads and visiting the well sites via the roads would not occur. The emissions associated with the building of the roads and performing well inspections are incorporated into Table 3.3i. The total emissions listed in Table 3.3i are relatively small, so the difference in emissions that would occur without the building of 6.5 miles of roads compared to Alternative 3 will not be quantified separately here. Under Alternative 2, the direct, indirect, and cumulative impacts that would occur would be the same as those presented under the no action alternative, except that they could continue for an additional 1.6 years (19 months).

Alternative 3 Environmental Effects

Under Alternative 3, the mining would continue for an additional 1.6 years and additional methane drainage wells would need to be constructed. The emissions associated with the building of the roads and performing well inspections are incorporated into Table 3.3i. The total emissions listed in Table 3.3i are relatively small. Under Alternative 3, the direct, indirect, and cumulative impacts that would occur would be the same as those presented under the no action alternative, except that they would continue for an additional 1.6 years.

Cumulative Effects & Climate Change

Cumulative Effects

Emissions from the mine will add to the regional emissions presented in the Gunnison and Delta county emissions table earlier. As the mine is already in operation and the annual rate of coal mining is not expected to increase, the cumulative impacts of the coal mine emissions along with regional emissions are already reflected in the monitoring data presented. The results from the 2010 modeling analysis completed as part of the mine's permit application (see Table 3.3e) contain the cumulative impacts that can be expected to PM_{10} concentrations. Cumulative impacts to visibility were also considered by the state when it completed its regional haze analysis and concluded that impacts from the mine would not be sufficiently large to warrant additional particulate matter controls. Both direct and indirect emissions of greenhouse gases will contribute to regional and national emissions. Because the mine is operating and coal from the mine is being used in various facilities, the figures for national and state greenhouse gas emissions should reflect the cumulative impacts including the mine's operations. Depending upon implementation of an Alternative selected, there may be a reduction (-16.4 months) or an increase (+1.6 years) in duration of emissions compared to baseline because of coal reserves on private or on parent coal leases that may be affected.

Climate Change

According to the U.S. Global Change Research Program (2009), global warming is unequivocal, and the global warming that has occurred over the past 50 years is primarily human-caused. Standardized protocols designed to

measure factors that may contribute to climate change, and to quantify climatic impacts, are presently unavailable. As a consequence, impact assessment of specific impacts related to anthropogenic activities on global climate change cannot be accurately estimated. Moreover, specific levels of significance have not yet been established by regulatory agencies. Therefore, climate change analysis for the purpose of this EIS is limited to accounting for GHG emissions changes that would contribute incrementally to climate change. Qualitative and quantitative evaluations of potential contributing factors are included where appropriate and practicable. (Source: http://globalchange.gov/what-we-do/assessment/previous-assessments/global-climate-change-impacts-in-the-us-2009).

For all discussion related to climate change, most of the text was copied directly from government (EPA and State of Colorado) prepared documents that are available to the public. Effects from GHGs may not be measurable for decades or centuries and modeling is very expensive and relies on assumptions. Predicting the degree of impact any single emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. As such, the controversy is to what extent GHG emissions resulting from continued mining may contribute to global climate change, as well as, the accompanying changes to natural systems cannot be quantified or predicted at this time. However, effects are presented in a general manner which we believe consistent with EPA's April 22, 2010 direction to the Rio Grande Field Office of the BLM (Project file, Earth Justice Comments Exhibit). Local effects are from the *Draft Watershed Vulnerability Assessment Pilot Project, Case Study: Grand Mesa, Uncompahgre and Gunnison National Forests* (April 2011).

Average Temperatures

Accumulation of greenhouse gases (including carbon dioxide) in the atmosphere is *very likely* the cause of most of the increase in global average temperatures (IPCC AR4 WGI 2007). In North America, temperatures have increased by 2°F in the last 30 years, and "human-induced warming has *likely* caused much of the average temperature increase over the past fifty years" (CCSP SAP 3.3 2008, p. 3). Climate models show a 1°F warming in the Western US over the last 30 years in response to greenhouse gas emissions from human activities (anthropogenic). However, no studies have specifically investigated whether the detected trends in Colorado can be attributed to anthropogenic greenhouse gases (http://cwcb.state.co.us/Home/ClimateChange/ClimateChangeInColoradoReport/).

The Intergovernmental Panel on Climate Change (IPCC) estimates it has warmed 1.2 to 1.4°F (0.7 to 0.8ºC) over the past century and projects a further 3 to 7°F (2 to 4ºC) over the 21st century. The increases may appear minor compared to short-term weather changes from night to day and winter to summer. In global climate terms, however, warming at this rate would be much larger and faster than any of the climate changes over at least the past 10,000 years (IPCC Climate Change 2007: The Physical Science Basis). Multiple independent measurements confirm widespread warming in the western United States. In Colorado, temperatures have increased about 2°F in the past 30 years (1977-2006). All regions examined within the state warmed during the last 30 years, except the far southeast corner, in which there was a slight cooling trend. Climate models project that Colorado will warm 2.5°F (+1.5 to +3.5°F) by 2025 relative to the 1950-1999 baseline and 4°F (+2.5 to +5.5°F) by 2050 with summers showing the larger temperature increase (http://cwcb.state.co.us/Home/ClimateChange/ClimateChangeInColoradoReport/). Locally, the temperature is expected to increase by approximately 2-3 ˚C (3.6-5.4 ˚F) by 2050 (Table 3.3j).

Table 3.3j. Temperature and Precipitation Climate Change Scenarios for 2050 developed by Barsugli and Mearns for the Gunnison Basin.

	Precipitation (%)		Temperature (˚C)	
	Moderate Scenario	More Extreme Scenario	Moderate Scenario	More Extreme Scenario
Annual	~0.0	-10.0	+2.0 to +3.0	+3.0
Winter	+15.0	~0.0	+2.0	+3.0
Spring	-12.0	-15.0	+2.5	+3.0
Summer	-15.0	-20.0	+3.0	+4.0
Fall	+4.0	-10.0	+2.5	+3.0

Extreme Temperature

Most scientists think that a warming climate will alter the frequency and severity of extreme temperature events. In general, they expect increases in heat waves and decreases in cold spells. These effects will vary from place to

place (IPCC Climate Change and EPA Climate Change Effects, Extreme Events). In Colorado, winter projections show fewer extreme cold months, more extreme warm months, and more strings of consecutive warm winters. Typical projected winter monthly temperatures are between the 10th and 90th percentiles of the historical record. Between today and 2050, typical January temperatures of the Eastern Plains of Colorado are expected to shift northward by approximately 150 miles. In all seasons, the climate of the mountains is projected to migrate upward in elevation, and the climate of the Desert Southwest to progress up into the valleys of the Western Slope (http://cwcb.state.co.us/Home/ClimateChange/ClimateChangeInColoradoReport/). Locally, there are expected to be fewer extreme cold months, more frequent extreme warm months, and more consecutive warm winters (Table 3.3c).

Extreme Weather Events

Because warm sea surface temperatures energize hurricanes, a warming climate is likely to make hurricanes more intense. Hurricanes in the future will probably have stronger peak winds and increased rainfall. The relationship between sea surface temperatures and the frequency of hurricanes is less clear. There is currently no scientific consensus on how a warming climate is likely to affect the frequency of hurricanes, but research continues (IPCC Climate Change and EPA Climate Change Effects, Extreme Events).

In a warming climate, extreme events like floods and droughts are likely to become more frequent. More frequent floods and droughts will affect water quality and availability. For example, increases in drought in some areas may increase the frequency of water shortages and lead to more restrictions on water usage. An overall increase in precipitation may increase water availability in some regions, but also create greater flood potential (IPCC Climate Change and EPA Climate Change Effects, Water).

Hydrology & Precipitation

Rising temperatures will intensify the Earth's water cycle. Increased evaporation will make more water available in the air for storms, but contribute to drying over some land areas. As a result, storm-affected areas are likely to experience increases in precipitation and increased risk of flooding. But areas located far away from storm tracks are likely to experience less precipitation and increased risk of drought. In the U.S., warming is expected to cause a northward shift in storm tracks, resulting in decreases in precipitation in areas such as the Southwest U.S. but increases in many areas to the north and east. However, these changes will vary by season and depend on weather fluctuations (IPCC Climate Change and EPA Climate Change Science, Future Precipitation).

Sea levels are rising worldwide and along much of the U.S. coast. Tide gauge measurements and satellite altimetry suggest that sea level has risen worldwide approximately 4.8-8.8 inches (0.12-0.22 m) during the last century. A significant amount of sea level rise has likely resulted from the observed warming of the atmosphere and the oceans. The primary factors driving current sea level rise include the expansion of ocean water caused by warmer ocean temperatures (warmer water is less dense), melting of mountain glaciers and small ice caps (resulting in more water in the oceans and less on land), and - to a lesser extent - the melting of the Greenland Ice Sheet and the Antarctic Ice Sheet. The Intergovernmental Panel on Climate Change (IPCC) projects a six-inch to two-foot (0.18-0.59 m) rise in sea level during the 21st century. Sea level rise may be greater if there are sudden increases in ice sheet melt. Such increases have already been observed but their effects have not yet been incorporated into current projections of sea level rise. The stability of the West Antarctic Ice Sheet is of particular concern. A sudden collapse of the ice sheet could raise sea levels 16 to 20 feet (5-6 m). The IPCC is unable to estimate the likelihood or timing of such a collapse, however, due to incomplete understanding of all the processes affecting this ice sheet (IPCC Climate Change 2007: Impacts, Adaptation and Vulnerability and EPA Climate Change Effects, Coastal Zones and Sea Level Rise).

Polar regions are expected to warm more than any other parts of the world. In part, this is because ice has greater reflectivity (also known as albedo) than ocean or land. Melting of highly reflective snow and ice reveals darker land and ocean surfaces, which increases absorption of the sun's heat and further warms the planet, especially in those regions. Polar ice sheets (such as those on Greenland and Antarctica) are some of the largest surface features on our planet. Any changes to them, however small, could have far-reaching effects. Polar ice sheets potentially will accumulate more snow and ice because of an increase in precipitation. However, overall melting due to global warming is expected to reduce the size and extent of the polar ice sheets. Melting of polar ice and land-based glaciers is expected to contribute to sea level rise. In addition to the ice sheets, sea ice is also melting. Though the melting of floating sea ice that covers part of the Arctic Ocean does not affect sea level, sea ice is important for wildlife and for keeping the region cool by reflecting sunlight back to space. If the Arctic loses the reflective surface of ice and then the dark Arctic Ocean absorbs more heat, the northern regions may warm even more rapidly (IPCC Climate Change and EPA Climate Change Effects, Polar Regions).

Coastal areas may be impacted by sea level rise and an increase in storm intensity. Rising seas may contribute to enhanced coastal erosion, coastal flooding, loss of coastal wetlands, and increased risk of property loss from storm surges (IPCC Climate Change and EPA Climate Change Effects, Coastal Zones and Sea Level Rise).

Increasing temperatures are projected to affect state water resources. In Colorado, no consistent long-term trends in annual precipitation have been detected. Variability is high, which makes detection of trends difficult. Climate model projections do not agree whether annual mean precipitation will increase or decrease by 2050. The multi-model average projection shows little change in annual mean precipitation, although a seasonal shift in precipitation does emerge. Widespread and large increase in the proportion of precipitation falling as rain rather than snow, and reduction in snow water equivalent (SWE) have been observed elsewhere in the West. In Colorado, however, these changes are smaller and not as significant. Most of the reduction in snowpack in the Western US has occurred below about 8200 ft. However, most of Colorado's snowpack is above this elevation, where winter temperatures remain well below freezing. Projections show a precipitous decline in lower-elevation (below 8200 ft) snowpack across the West by the mid-21st century. Modest declines are projected (10–20%) for Colorado's high-elevation snowpack (above 8200 ft) within the same timeframe. Between 1978 and 2004, the spring pulse (the onset of streamflows from melting snow) in Colorado has shifted earlier by two weeks. Several studies suggest that shifts in timing and intensity of streamflows are related to warming spring temperatures. The timing of runoff is projected to shift earlier in the spring, and late-summer flows may be reduced. These changes are projected to occur regardless of changes in precipitation. Recent hydrology projections suggest declining runoff for most of Colorado's river basins in the 21st century. However, the impact of climate change on runoff in the Rio Grande, Platte, and Arkansas Basins has not been studied as extensively as the Colorado River Basin. The lowest five-year period of Colorado River natural flow since records began in the late 1800s occurred in 2000 to 2004 (9.9 million acre feet per year). Recent hydrologic studies of the Upper Colorado River Basin project multi-model average decreases in runoff ranging from 6% to 20% by 2050 compared to the 20th century average, although one statistical streamflow model projects a 45% decline by 2050. The range of individual model projections within a single study can include both increasing and decreasing runoff due to the range of climate model output used to drive the hydrology models. Ongoing studies are attempting to resolve methodological differences in order to reduce the range of uncertainty in runoff projections. Throughout the West, less frequent and less severe drought conditions have occurred during the 20th century than revealed in the paleoclimate records over the last 1000 years. Precipitation variations are the main driver of drought in Colorado and low Lake Powell inflows, including the recent drought of 2000–07, and these variations are consistent with the natural variability observed in long-term and paleoclimate records However, warming temperatures may have increased the severity of droughts and exacerbated drought impacts (http://cwcb.state.co.us/public-information/publications/Documents/ReportsStudies/ClimateChangeReportFull.pdf). Locally, under a moderate scenario, no substantial change in annual precipitation, but an increase in cool season precipitation and a decrease in warm season precipitation is expected. And under a more extreme scenario, a 10% decrease in annual precipitation, with greater decreases in warm season precipitation. Under a moderate scenario, a decrease in annual natural stream flows of 5 to 10% is expected due to increased temperature, even if annual precipitation remains the same. And under a more extreme scenario, a decrease in precipitation and increase in temperature both act to reduce annual stream flow totals in the range of 20 to 25%. Warming temperatures lead to a later accumulation of snow in the fall, and earlier snowmelt in the spring. However, because of the increased precipitation in winter, and the generally cold, high-elevation nature of the upper Gunnison basin, the mid-winter snowpack may be similar to the present under a moderate scenario. And under a more extreme scenario, this likely represents a hot/dry scenario for much of the West, the potential exists for more frequent dust deposition events, which also may lead to an earlier melt and to reduced water yield from the snowpack. Under a moderate scenario, snowmelt-driven stream flow will occur earlier in the spring by about a week on average. (Note: this shift is due to warming and does not include the effects of dust-on snow, which can result in an even earlier shift in snowmelt. And under a more extreme scenario, snowmelt-driven stream flow will peak about two or more weeks earlier in the spring, though this effect may be less if dust effects on snowmelt are strong. The combined effects of dust and temperature on snowmelt timing tend to be dominated by the dust effects. For more local effects see Table 3.3k.

Table 3.3k. Projected Climate Changes to the GMUG.

Projected Climate Change	Anticipated Hydrologic Response	Potential Consequences to Resource Values
Warmer Winter/Spring Temperatures Average daily winter/spring temperature expected to increase > 3˚C by 2050.	• Fewer extreme cold months, more frequent extreme warm months, more consecutive	• Reduced duration of winter snow cover. • Longer period of saturated

Projected Climate Change	Anticipated Hydrologic Response	Potential Consequences to Resource Values
	warm winters • Later accumulation of snowpack. • Earlier onset of snowpack runoff (1-3 weeks) • Higher winter stream flows • Increased water temperature • Winter precipitation more often rain than snow below 8200 feet • Snowline to move up in elevation.	roadbeds vs frozen roadbeds. • Increased demand for water storage. • Earlier demand for irrigation water. • Decreased summer stream flows. • Potential change to aquatic species reproductive triggers or success. • Increased risk to channel and floodplain infrastructure from higher runoff. • Increased risk to riparian habitat/floodplains from higher flows. • Changes to winter habitat, winter recreation and plant communities.
Warmer Summer Temperatures Average daily summer temperature expected to increase > 3˚C by 2050.	• Increased evapotranspiration • Decreased soil moisture • Reduced summer stream flows • Increased water temperature	• Increased demand for irrigation water. • Shifts in cold water habitat to higher elevations. • Increases in warm water habitat. • Decreased dissolved oxygen in lower elevation streams during the summer. • Aquatic biota mortality and even loss of populations. • Loss of summer stream flow.
Changes in Precipitation At higher elevations may be slightly greater precipitation during the winter, but likely less total precipitation, especially during warmer months.	• May see higher peak flows associated with snowmelt, earlier in the year. • Lower summer and fall baseflows • Increased soil moisture during spring at lower elevations	• Decreased water availability during irrigation season. • Increased risk to channel and floodplain infrastructure. • Reduced riparian vegetation health and vigor. • Increased landslides and slumps on geologically unstable areas. • Increased potential damage to saturated roadbeds. • Reduced aquatic habitat in summer and fall.
More intense storms Warmer atmosphere has potential for increase in frequency and magnitude of big storms	• Localized flooding • Increased debris flows • Increased hillslope and channel erosion	• Increased risk to channel and floodplain infrastructure from sediment and high flows. • Increased concern for public safety. • Increased selenium load in streams where Mancos Shale exposure is significant.

Projected Climate Change	Anticipated Hydrologic Response	Potential Consequences to Resource Values
More frequent and longer periods of drought	• Less soil moisture • Reduced groundwater recharge • Lower summer and fall baseflow	• Increased erosion associated with natural disturbances associated with drought (e.g. fire). • Increased plant stress and susceptibility to insect and disease mortality. • Reduced groundwater contribution to baseflows • Reduced discharge from springs • Reduced wetland/riparian function.
Increase winter dust deposition on snowpack	• Accentuate changes to snowpack melt	• Similar to warmer winter consequences.

Habitats & Species

Some ecosystems have already been affected by changes in climate. As the climate continues to warm, major changes may occur in ecosystem structure and function, species' ecological interactions, and species' geographic ranges, with predominantly negative consequences for biodiversity. Warmer temperatures and precipitation changes will likely affect the habitats and migratory patterns of many types of wildlife. The range and distribution of many species will change, and some species that cannot move or adapt may face extinction. In addition, climate changes such as increased floods and droughts are predicted to increase the risk of extinction for some plant and animal species, many of which are already at-risk due to other non-climate related factors (IPCC Climate Change and EPA Climate Change Effects, Ecosystems and Biodiversity). For local effects see Table 3.3k.

Health

A warming climate will have both positive and negative impacts. Local impacts are the most difficult to predict, making it a challenge to know exactly who or what will be harmed or benefit. Generally, the risk of negative impacts from climate change increases the faster it warms. More rapid climate change makes adapting to change more difficult and costly. This is especially true for vulnerable groups (such as the poor, the very young and older adults) and fragile ecosystems which may struggle to adapt to even small changes. The Intergovernmental Panel on Climate Change (IPCC) suggests that temperature increases above the range of 3.5 to 5.5°F (2 to 3ºC) over the next 100 years would dramatically increase the negative impacts of climate change. So a major aim of climate action is to reduce the risk and likelihood of large, rapid warming (IPCC Climate Change 2007: Impacts, Adaptation and Vulnerability). Longer, more intense and frequent heat waves may cause more heat-related death and illness. There is virtual certainty of declining air quality in cities since greater heat can also worsen air pollution such as ozone or smog. Insect-borne illnesses are also likely to increase as many insect ranges expand. Climate change health effects are especially serious for the very young, very old, or for those with heart and respiratory problems. Conversely, warmer winter temperatures may reduce the negative health impacts from cold weather (IPCC Climate Change 2007: Impacts, Adaptation and Vulnerability and EPA Climate Change Effects, Health). For local effects see Table 3.3k.

Food Availability

The supply and cost of food may change as farmers and the food industry adapt to new climate patterns. A small amount of warming coupled with increasing CO_2 may benefit certain crops, plants, and forests, although the impacts of vegetation depend also on the availability of water and nutrients. For warming of more than a few degrees, the effects are expected to become increasingly negative, especially for vegetation near the warm end of its suitable range (IPCC Climate Change and EPA Climate Change Effects, Agriculture and Food Supply). For local effects see Table 3.3k.

Costs

Warmer temperatures may result in higher energy bills for air conditioning in summer, and lower bills for heating in winter. Energy usage is also connected to water needs. Energy is needed for irrigation, which will most likely

increase due to climate change. Also, energy is generated by hydropower in some regions, which will also be impacted by changing precipitation patterns (IPCC Climate Change and EPA Climate Change Effects, Energy Production and Use). For local effects see Table 3.3k.

Recreation

Outdoor recreation activities may benefit from longer periods of warm weather. However, many other outdoor activities could be compromised by increased beach erosion, increased heat waves, decreased snowfall, retreating glaciers, reduced biodiversity, and changing wildlife habitats (IPCC Climate Change and EPA Climate Change Effects, Public Lands, Recreational Opportunities, and Natural Resources). For local effects see Table 3.3k.

Consistency with Forest Plan and Other Laws

Proposed Action would be consistent with air quality and fugitive dust provisions required by the CAAQS and NAAQS and PSD increments as well as alternative gaseous emissions regulated by MSHA and EPA. The proposed action is also consistent with Forest Service Manual 2580-Air Resource Management and the 1991 GMUG Forest Plan.

3.4 Topographic & Physiographic Environment

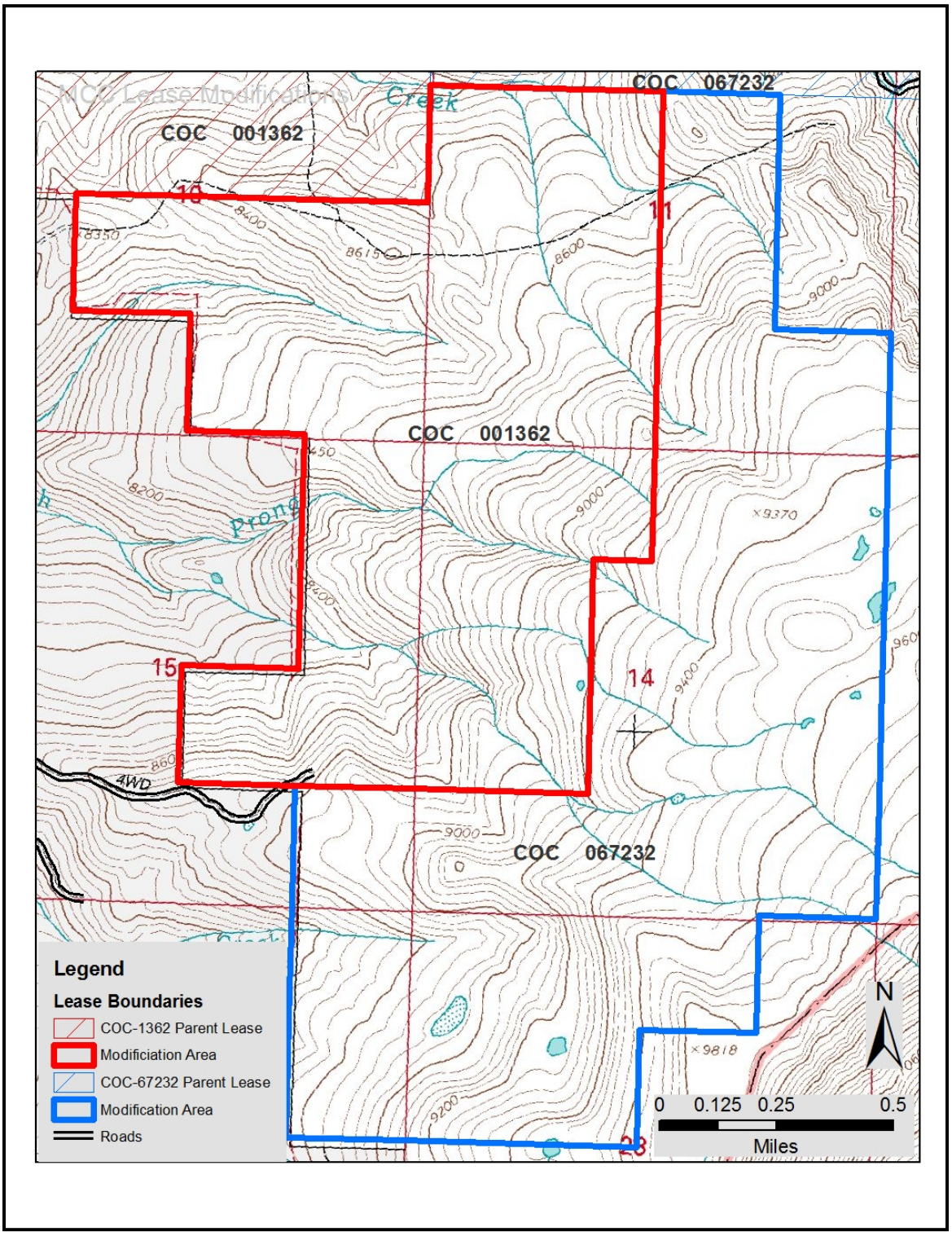
Affected Environment

The analysis area encompasses the lands within and immediately surrounding the lease modification area. Topography of the general area ranges greatly from steep to relatively flat (Figure. 3.4).

The elevations in the lease modification area range from about 8,200 feet to around 9,800 feet. The Proposed lease modifications are drained by Lick Creek, South Prong Creek, and Horse Creek, all which drains into the East Fork of Minnesota Creek. These drainages eventually empty into the North Fork of the Gunnison River. The topography of the area has been greatly influenced by a wide range of mass movement landforms and historic geologic processes (e.g., erosion, faulting, and the intrusion of the West Elk Mountains).

The area in and around the lease modifications contain localized landslides and rock falls (both natural and mining induced). Landslides/earth movements in this region are usually preceded, accompanied, and followed by perceptible creep along the surface of the slide or within the slide mass.

Figure 3.4. Lease Modification Topography.



Alternative 1 Environmental Effects

If the No-Action Alternative is selected, coal would not be mined in the lease tracts. The coal resource and the topography of the proposed lease modifications would remain unchanged except for natural processes. Natural processes would continue shape the landscape.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

The actual leasing of the proposed lease modifications would impose no topographic change on the tracts. If the tracts are leased, subsequent underground longwall mining would cause approximately 2400 acres of subsidence, in and around the lease modifications.

Subsidence occurs in areas above and adjacent to longwall mining. The amount of mining- induced subsidence, physical lowering of the land surface, triggered by longwall mining depends on the thickness of coal extracted. Other surface expressions of subsidence such as cracks, slope failure, etc., depend on many factors including mine plans, geologic strata, and overburden depth. As a general rule, the greater the overburden thickness, the less surface expressions are produced. Surface expression (other than physical lowering of the land surface) is most noticeable on ridges and steeper slopes, particularly cliffs, where cracks might appear. Based on annual field subsidence observations conducted by MCC, maximum crack depth in areas with slope <30% is 5-15 feet; in areas with slopes >30% cracks are 10-35 feet deep (WWE, 2010). Fewer cracks appear in the valleys than on ridges because the alluvial material is fine-grained sand and clay material that can yield without cracking or bulging as it deformed by the subsidence process (WWE, 2010).

Previous mining subsidence in the general vicinity has created landslides and rockfalls on the edges of ridges and cliffs. Some of these geologic instabilities are small scale features, affecting less than 100 cubic yards, but others can be large scale, affecting thousands of cubic yards of material. Because of the more subtle topography in the proposed modifications, large scale rock fall events are not anticipated.

Other natural factors may cause an acceleration of earth movement, which may mimic mine-induced instability. For example, during an extremely wet spring, the moisture from snowmelt and spring rains could cause natural landslides and rock falls to move and shift. Therefore, to an outside observer it is sometimes difficult to assess whether a mass movement is occurring due to subsidence or other naturally occurring processes.

As mentioned previously, the thickness of coal mined and overburden thickness influences the total amount of subsidence. For example, assuming a coal extraction thickness of 11 feet for the E-seam in the adjoining leases, and a overburden for the E-seam ranging from 400-1,425 feet, surface subsidence would be expected to be anywhere from 4 to 8 feet.

Topographic changes caused by subsidence with longwall mining are often unnoticeable to the untrained eye. Subsidence at any given point on the surface begins when the longwall face is beneath that point and is generally 90 % complete when the longwall face has passed at 1.2 to 1.4 times the overburden depth beyond the point of mining. For example for a an area where there is 500 feet of over-burden, subsidence from longwall mining would be 90% complete within about a month when the longwall face (active mining area) is 600 to 700 feet beyond that point on the surface.

Subsidence associated with authorizing the lease modifications is expected to affect about 2,400 acres (includes additional adjacent reserves on private and federal lands made accessible via lease modifications). Other than lowering the land surface, the long-term effects of subsidence on surface topography would be minimal, and even unnoticeable to most casual observers. Some residual cracks may remain in the more brittle bedrock material on ridges or cliffs. Overall, the topography above subsided longwall mining workings would be similar to the pre-mining topography, albeit lower in elevation. Subsidence from underground mining could initiate, aggravate, and perhaps even accelerate, the existing landslides and rock falls in the area.

There are no anticipated indirect long-term topographic impacts expected for surface facility disturbances supporting underground mining activities. These areas would be re-graded and re-contoured following mining closure and removal of structures in such a manner that the area would blend into the surrounding undisturbed terrain.

Currently, subsidence monitoring is a requirement of the mine permit issued by the Colorado DRMS. If surface cracks occur that affect other uses (roads, trails, etc.), the surface management agencies have authority to require timely on-site mitigation per the two subsidence stipulations identified in Section 2.1. Therefore, no additional stipulations are recommended beyond those in the parent lease.

Cumulative Impacts

The North Fork Valley region east of the town of Paonia has numerous existing natural landslide and other unstable areas. These natural features when combined with subsidence from existing and future coal mining would continue to contribute to future changes in the topography of the area. Thousands of acres of land have been subsided due to mining in the North Fork Valley. Disturbances associated with future foreseeable (roads, drill pads) also will create areas free of vegetation and increase soil erosion capability. In addition, if landslides and rockfalls are initiated or accelerated due to subsidence, increased sedimentation and erosion is likely to occur in those areas. Previous experience in the North Fork has demonstrated that subsidence triggered mass wasting has not significant enough to adversely affect terrestrial and aquatic ecology.

If the lease modifications are granted effects similar to those described in Alternative 3 could occur on the adjacent private land while mining 5.6 million tons of private coal reserves and on parent leases where additional 3.3 million tons federal coal reserves may be mineable.

Consistency with Forest Plan and Other Laws

All action alternatives are consistent with Forest Plan standards for geology which establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites. Other impacts to the surface resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

3.5 Geology

Affected Environment

General Geology

The Proposed lease modifications lie in the Paonia-Somerset coal field. The main coal beds within this area are found in the Upper Cretaceous Mesa Verde Formation. The coal bearing sedimentary strata of the Mesa Verde Formation are relatively flat lying with a regional dip of approximately five degrees to the north/northeast. Local dips can vary. The principal mineable coal seam in the proposed lease modifications is the "E" seam. Other seams within the tract (A, B, C, and D), are either considered too thin (less than 6 feet) or are too discontinuous to mine.

The Tertiary Wasatch Formation, Upper Cretaceous Mesa Verde Formation, and Quaternary deposits outcrop within the area. The Cretaceous Mancos Shale does not outcrop on the lease tracts but lies below the Mesa Verde Formation. The following is a brief overview of the geologic units in the area:

- *Quaternary Deposits:* The Quaternary deposits are an unsorted mixture of soil and rock formed by various mass-wasting processes such as landslides, earth flows, soil creep, and debris avalanches. These deposits also include slope colluvium and Quaternary unconsolidated deposits derived from the Wasatch Formation.
- *Wasatch Formation (Tertiary):* The Wasatch formation overlies the Mesa Verde Formation. It consists of red and buff shales and red sandstones in the upper part of the formation, and red to gray conglomerates in the lower portion. The Ohio Creek conglomerate, which is the basal conglomerate unit, is a regional marker and commonly referenced geologic mapping datum.
- *Mesa Verde Formation* (Cretaceous): The Mesa Verde Formation is the primary coal bearing formation in this region and conformably overlies the Mancos Shale Formation. It consists of approximately 2,300 feet of interbedded coal seams, sandstones, shales, and siltstones. The Mesa Verde Formation consists of the Barren Member, Paonia Member, Bowie Member, and Rollins Sandstone Member. The Barren Member is approximately 1,600 feet in thickness and contains no coal seams. The Paonia Member ranges from approximately 300 to 500 feet and is composed of shales and interbedded sandstone. The Paonia Member contains the D and E coal seams. The Bowie Member ranges from 270 to 350 feet thick

and consists primarily of grey shales, interbedded lenticular sandstones, and coal seams. The Bowie Member contains the A, B, and C coal seams. The Rollins Sandstone ranges from 120 to 200 feet in thickness. It is a massive, cross-bedded medium to coarse grained, buff to white sandstone unit. The Rollins Sandstone lies conformably on the underlying Mancos Shale and is relatively continuous throughout the area, thus serving as a common marker bed.

- *Mancos Shale (Cretaceous):* The Mancos Shale is a regionally extensive bed of marine shales ranging up to 4,000 feet in thickness. In the lease tracts, it underlies the exposed geologic sequence. West of the town of Somerset, the North Fork of the Gunnison River has cut through the upper portion of the Mancos Shale, exposing the grey marine shales which are prominent with this formation.

Geologic faults in the area have been observed to have steep "dips" (ranging from about 75 degrees to vertical) and "throws" varying from 0-10 feet.

Geologic Hazards

Lands within and surrounding the modification area display numerous existing natural landslide features and other unstable slopes.

Geologic hazards have been mapped in accordance C.R.S. 1973, 24-65.1-101, et. seq.. Geologic hazards, which are a normal dynamic process, can be intensified or lessened by human activity. Most of the geologic hazards observed in area are historic in nature. However, during periods of high precipitation there is increased movement of existing landslides and development of new landslides on unstable slopes.

Previous mining in the general vicinity has initiated landslides and rockfalls on steep terrain, and on edges of ridges and cliffs. Some of these geologic instabilities are small scale features, affecting less than 100 cubic yards, but others can be large scale, affecting 1000s of cubic yards of material.

Other Geologic Resources

The lands in the area have been rated as having high potential for oil and gas (GMUG Final Oil and Gas Leasing EIS). The project area is near the edge of the productive natural gas basin The Oil and gas resources under the modification area have not been leased.

Methane found in the coal seams and surrounding sandstones is released through the mining process ("coal mine methane") as a by-product of the coal. See Air Quality Section for further discussion on methane released from mining activity.

Other than the E-seam, other coal seams in the project area are not considered economically recoverable.

Alternative1 Environmental Effects

If the No Action Alternative is selected, coal would not be mined in the lease tracts. The coal resource and the structural and lithologic integrity of the Proposed Lease modification area would remain in-place. The potential to recover the coal resource at some time in the future would remain. Geologic instabilities, such as landslides and rockfalls would continue at historic natural magnitudes.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

General Geology & Geologic Hazards

If leasing and subsequent mining proceeds on the proposed lease modifications, coal would be removed and the overlying overburden material would be altered through subsidence. The coal would be extracted via longwall methods as under the proposed action.

The overburden (including existing geologic structure and lithologic continuity) would be altered by subsidence due to the collapse of material into the void caused by extraction of coal. However, due to the thickness of the overburden in the lease tract, and the absence of bedrock cliffs, it is anticipated that evidence of subsidence would not be easily seen by casual observers.

Previous mining has demonstrated the potential for mining subsidence to aggravate existing landslides and other geologic hazards. As subsidence causes tension zones near the edges of steep ridges and/or existing unstable features, this force can induce shearing and movement within the rock formations, thereby initiating mass movement. There are a number of landslides and other unstable slopes in the region. Subsidence beneath such steep slopes could contribute or aggravate landslide movements, but this determination is difficult to quantify given the natural (pre-mining) geologic instability of the local area.

Other natural factors may cause an acceleration of impacts, which may mimic mine-induced instability. For example, in an extremely wet spring, moisture from snowmelt and spring rains could cause an increase in natural landslides and rock falls. That said, it is sometimes difficult to assess whether a mass movement is occurring due to mine operations or naturally occurring processes.

Mining induced seismic events as a result of longwall mining may occur. Based on existing information, these events are not expected to cause damage to surface resources or overlying structures. MCC is currently participating with the National Institute of Occupational Safety and Health (NIOSH), and is part of the North Fork Valley Seismic Network. MCC manages 6 seismic stations as part of this network, and seismicity reports are generated quarterly (see project file for further information).

Other Geologic Resources

Mining of the coal seam(s) could result in methane loss within the coal bed. Recoverability of any gas resource present in geologic formations in and/or above the coal seams could be reduced due to the evacuation of gas through mine ventilation, see the Air Quality section for details. Gas resources below mine operations should not be affected unless connected by faults or other permeable features. In a regional sense, areas of shallow overburden between the coal and surface (e.g. where the mines operate) the gas resource has not proven to be economic on its own.

Any oil and gas resources in the extracted coal seam would be lost. Recoverability of any oil and gas resources present in geologic formations above and below the coal seams could be reduced. However, due to the fracturing of the rock from mining, the potential also exists for future recoverable gas resources to be enhanced due to increased porosity and permeability. This increased recoverability has led at least one coal mine operation to invest into electricity generation by collecting methane from inactive workings.

Currently, subsidence monitoring is a requirement of the mine permit issued by the Colorado DRMS. If surface cracks or mass movements occur that affect other uses (roads, trails, etc.), the surface management agencies have authority to require timely on-site mitigation. The Colorado DRMS requires detailed information, monitoring, and repair of subsidence impacts as set forth in Section 2.05.6(6), Subsidence Survey, Subsidence Monitoring, and Subsidence Control Plan, of the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining. These regulations have been in force for Colorado since 1980.

In addition, with respect to steep slopes and geologically unstable areas, the parent lease contains stipulations that preclude surface occupancy within these areas. These stipulations will be carried forward to the modifications.

Therefore, no additional stipulations are recommended beyond those in the parent lease for this resource area.

Cumulative Impacts

Historically, a considerable amount of the area north of the lease modifications has been, or will be mined. Both natural and mine induced mass movements are likely to continue in the vicinity of the lease modification area. In addition, if landslides and rockfalls are initiated or accelerated due to mine operations, increased sedimentation and erosion is likely to occur in those areas. Due to the naturally occurring mass movements, and natural sedimentation loads and erosion rates, it would be difficult to quantify natural vs. mine induced changes. Previous experience in the North Fork has demonstrated that subsidence triggered mass wasting has not significant enough to adversely affect terrestrial and aquatic ecology.

With respect to future surface operations within the lease modifications (e.g. methane drainage and exploration), construction and use of access roads and drill pads in steep slopes or areas of geologic instability could increase

the impacts associated with these features. Historically areas of geologic instability have been avoided, and methane drainage has been accommodated in this type of terrain using directional drilling techniques on a limited basis.

Gas production, in a conventional sense, would likely not occur until coal mining ceases in this area.

If the lease modifications are granted effects similar to those described in Alternative 3 could occur on the adjacent private land while mining 5.6 million tons of private coal reserves and on parent leases where additional 3.3 million tons federal coal reserves may be mineable.

Consistency with Forest Plan and Other Laws

All action alternatives are consistent with Forest Plan standards for geology which establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites. Other impacts to the geologic resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

3.6 Soils

Affected Environment

Authorities specifically governing Forest Service soil management include the Multiple-Use Sustained Yield Act of 1960 and the Forest and Rangelands Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976 (NFMA). The GMUG Forest Plan authorizes and governs management of mineral resources and surface uses over them. With respect to soils management, the GMUG Forest Plan establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites. The Forest Plan further directs using site preparation methods to keep fertile topsoil intact, revegetating areas disturbed during road construction, and design mitigations and restoration to ensure that 80 % original ground cover occurs within 5 years after disturbance.

Regulations adopted pursuant to the Surface Mining Control and Reclamation Act of 1977 and the State of Colorado's OSM-approved permanent program for coal mining per the Colorado Surface Coal Mining Reclamation Act as administered by the CDMG with oversight from the OSM, govern all direct effects of coal mining, including those that may impact soils. These acts and attendant regulations require that topsoil be removed, stockpiled, and replaced on reclaimed surfaces associated with construction or mining disturbance. Other impacts to the soil resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

Soils information and technical data were taken from the following soil survey completed for the project area: An Order III soil survey, entitled Soil Survey of Grand Mesa-West Elk Area (Cryer and Hughes, 1997) was used to characterize and describe the soils overlying that portion of the project area administered by the Forest Service. This survey each contains soil maps depicting the aerial extent of the soils delineated as well as map unit descriptions, typical pedon descriptions, and interpretation tables which were used to develop the text below. No site-specific soil baseline studies were conducted for the modification area as a part of this project.

Soils in the project area have developed from a combination of residual, colluvial, and alluvial materials derived from local bedrock. The soil survey identified and described six map units within the tract. The map unit name, percentage coverage within the modification area, dominant soil series and attendant percent map unit composition, relative depth, hazard classifications (water erosion, shrink swell, and mass movement), and considerations as described in the soil survey are shown in Table 3.6.

Project area soils are generally deep, fine textured and well suited for vegetative production with steep slopes being the primary limitation on use. Erosion and mass movement are potential hazards associated with most soils in the area, due to fine textures. Soils on steeper slopes have slower infiltration rates, resulting in more surface flow and erosion. Mass movement on steep slopes is also a potential hazard, with Wetopa and Wesdy soil types having the highest potential hazard rating within the tract (Table 3.6). Fine textures and high activity clays result in a moderate to high shrink swell hazard ratings for most soil types. At the leasing stage, the locations of surface uses are not known; therefore more detailed soil information at the sites proposed for disturbance, potential salvage depths, and volumes cannot be estimated. Location-specific soil resource data will be reviewed in more detail following if and when post-leasing surface use is proposed.

Table 3.6. Summary of Soil Resources in the Proposed Lease Modifications Area.

Map Unit Name	Percent of Area	Dominant Soil Series	Depth	Hazard			Considerations For Use
				Water Erosion	Shrink Swell	Mass-Movement	
Cryoboralfs, Cryochrepts, and Rubble land, 5 to 65 percent slopes	4	Cryoboralfs soil and similar soils	S - VD	L - H	L	L - M	None noted.
		Cryochrepts soil and similar soils	S - D	L - H	L	M	None noted.
		rubble land					Large exposures of loose rock.
Herm - Fughes - Kolob Family Complex; 25-40% slopes	3	Herm soil and similar soils	VD	L - H	H	L - M	Steep slopes in some areas; high shrink-swell potential; slow permeability; high soil erosion hazard in steeper areas; moderate mass movement potential in steeper areas; clayey subsurface soil textures.
		Fughes soil and similar soils	D	M - H	H	L - M	
		Kolob Family and similar soils	VD	L - H	M	L - M	Steep slopes in some areas; moderate shrink swell potential; slow permeability; high soil erosion hazard in the steeper areas; subsurface rock fragments; clayey surface soil textures; clayey subsurface soil textures; moderate mass movement potential in the steeper areas.
Needleton - Scout families complex, 5 to 40 percent slopes	5	Needleton soil	VD	L – M	L	L	Steep slopes in some areas, moderate soil erosion hazard in the steeper areas, subsurface rock fragments, (Needleton family - moderate mass movement potential on slump block benches)
		Scout Family soils	VD	L – M	L	L	
Scout - Needleton families complex, 40 to 65 percent slopes	15	Scout Family soils	VD	M – H	L	L	Subsurface rock fragments, steep slopes in some areas, high soil erosion hazard in the steeper areas, (Scout family - limited available water capacity)
		Needleton soil	VD	H	L	L	
Shawa - Sandia family - Kolob family complex, 5 to 40 percent	1	Shawa soil	VD	L - H	L	L	Steep slopes in some areas, high soil erosion hazard in the steeper areas (Sandia family - subsurface rock fragments and slow permeability)
		Sandia family soil	D	H	L	L-M	

Map Unit Name	Percent of Area	Dominant Soil Series	Depth	Hazard			Considerations For Use
				Water Erosion	Shrink Swell	Mass-Movement	
slopes		Kolob family soil	VD	L -M	M	L - M	Steep slopes, high soil erosion hazard, clayey subsurface soil textures, subsurface rock fragments, moderate shrink-swell potential, high mass movement potential in the steeper areas
Taterheap-Papaspila Complex, 5-40 percent slopes	13	Taterheap and similar soils	VD	L - H	M	L	Elevated erosion hazard in steep slope areas. Moderately slow permeability. Subsurface rock fragments in Papaspila soils.
		Papaspila soil and similar soils	VD	L - H	L	L	
Wetopa - Wesdy Complex, 5-65 percent slopes	56	Wetopa soil and similar soils	VD	L - H	H	L - H	Slow permeability; high erosion hazard and mass movement potential on steep slopes; shrink-swell potential. Subsurface rock fragments in Wesdy soils.
		Wesdy and similar soils	VD	L - H	M	L - H	
Coberly – Falcon, dry complex, 0-15% slopes	3	Coberly and similar soils	MD	L	L	L	Shallow bedrock; low water-holding capacity. Root limiting layer in Falcon dry soils.

Depth Classes: S = Shallow; D = Deep; VD = Very Deep Hazard Ratings: L = Low; M = Medium; H = High

Source: Cryer and Hughes 1997

Alternative 1 Environmental Effects

The Proposed modifications would not be leased and no mining would occur; therefore, soil conditions would exist in their current state without effects from mining and associated activities. Ongoing natural processes and other existing land uses would continue.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

to have notably different impacts. Assuming the RFMP (Section 3.2), impacts to the soil resource due to subsidence would include cracks and other surface manifestations in areas of shallow overburden, where surface rocks are brittle, or where soils are shallow over bedrock. Soil cracking is most likely to occur at the ends of individual longwall panels and over the gate roads where the land surface is left in a tensional state after mining. Subsidence cracks that might develop in soil or colluvium tend to self-heal due to sloughing and natural filling by soil material. This type of disturbance to soils at the surface are likely to heal a few years after mining is complete. Subsidence has potential to affect surface water channels and basins and could result in increased rates of erosion. Soil erosion within drainage basins and resultant sediment loading may be increased until ground movements associated with subsidence stabilize relative to natural conditions.

Post-lease surface use of approximately 72 acres could occur over the life of the lease modifications as a result of access roads, methane drainage, and related activities. Approximately 2400 acres of surface disturbance (i.e. lowering of surface) related to subsidence may be expected. In addition, subsidence can induce slope movement in naturally unstable areas. Site specific locations of potential surface activities are unknown, but are expected to be distributed throughout the lease modification area. Effects of post-leasing activities will be evaluated on their own merits if/when activities are specifically proposed.

Post-lease activities would be conducted in accordance with regulations administered by the CDMG under OSM oversight. These regulations require detailed surface use plans that ensure the soil resource is salvaged prior to surface use and replaced as part of the reclamation processes. Measures would be developed and required as necessary to amend nutrient levels, control erosion, alleviate compaction, and mitigate other soil resource impacts, including those resulting from subsidence. However, even with implementation of these management practices, some soil loss may occur and disturbed soils may temporarily or permanently exhibit reduced productivity.

With respect to previous surface disturbances on nearby leases, revegetation has been observed to be generally successful between two and five years after reclamation work is completed. Activities resulting in disturbance on steep or unstable slopes of soil types with high erosion or mass movement hazard may result in increased erosion or trigger landslides. These hazards and related effects of disturbance are more likely to be present where existing geologic hazards and steep slopes are present. Disturbances on these slopes may also prove more difficult to revegetate and stabilize during reclamation. The GMUG Forest Plan calls for limiting ground-disturbing activities on unstable slopes and highly erosive areas. These types of stipulations are proposed to be carried forward from the parent lease.

No additional stipulations are recommended for soils other than those addressed in the parent leases. Proper soil management and reclamation measures are required by the surface management agencies on disturbed sites. Colorado DRMS would also require proper soil management procedures as part of their mine permits.

In general, reclamation has been highly successful with all mine disturbances (see project file). Through proper topsoil management, native seeding, and an aggressive noxious weed abatement program, mines in the North Fork Valley have been very successful in maintaining soil viability.

Cumulative Impacts

Soils in the modification area, adjacent federal leases, and private lands, could be affected by construction of exploration drill pads and temporary road construction from exploration activities (Sections 3.1 and 3.2). If the lease modifications are granted effects similar to those described in Alternative 3 could occur on the adjacent private land while mining 5.6 million tons of private coal reserves and on parent leases where additional 3.3 million tons federal coal reserves may be mineable. The areas would be reclaimed at the completion of use. Reclamation has been highly successful with all mine disturbances (see project file).Future methane drainage could also occur in these areas. Assuming a 72 acre disturbance footprint that gets reclaimed over >1,700 acres with little to no other uses is a minimal surface disturbance impact that would not adversely affect the soil resource or productivity of the area.

Mining and subsidence would occur within the modification area and adjacent federal leases and private lands, lowering the land surface. Surface-tension cracks may form at isolated locations within these areas. Additional surface facilities and temporary roads may be proposed and approved on lands in and surrounding the proposed lease tracts. These additional surface disturbing activities would affect the soil resource by displacing soils at specific locations. The topsoil and subsoil is stockpiled and reserved for reclamation. Contemporaneous reclamation techniques would be used, thus replacing/re-using the soils on the site as soon as the location is no longer needed.

Few adverse impacts to soils have been observed during subsidence and reclamation monitoring at nearby mines. Reclamation of surface use sites, including methane drainage drill sites, exploration drill sites and associated temporary roads, has been generally successful in three to five years following reclamation. Reclamation typically includes re-grading the surface to approximate original contour and revegetating with a specified seed mix. The area of surface disturbance in the region will temporarily increase during construction, returning to conditions similar to pre-disturbance following reclamation. Through proper topsoil management, native seeding, and an aggressive noxious weed abatement program, mines in the North Fork Valley have been very successful in maintaining soil viability.

The area within and adjacent to the lease modification area contains numerous existing natural landslides and other unstable areas. These natural features when combined with surface disturbing activities and subsidence from existing and future coal mining would continue to contribute to localized increased sedimentation. In addition, if landslides and rockfalls are initiated or accelerated due to subsidence, increased sedimentation and erosion is likely to occur in those areas. Previous experience in the North Fork has demonstrated that subsidence triggered mass wasting has not significant enough to adversely affect terrestrial and aquatic ecology.

Consistency with Forest Plan and Other Laws

All action alternatives are consistent with Forest Plan and FSM 2880 standards for soils which establish limits on ground-disturbing activity on unstable slopes and highly erodible sites. Other impacts to the soil resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

3.7 Watershed

Affected Environment

The study area required to address the impacts to water resources from the proposed lease modifications is defined by the watershed boundaries of the local drainages (Figure 3.7), and the area directly impacted by subsidence. The following sections include discussion of the regional hydrologic setting, flow characteristics within the surface drainage system, groundwater systems, analysis of surface water quality, water rights, and environmental consequences with leasing and the cumulative impacts on water resources. The following information sources were used for this evaluation:

- Surface water and groundwater quality and quantity data for regional hydrology from the USGS;
- Review of MCC data, including annual hydrology reports, permit applications, and other reports related to surface water and groundwater hydrology.

The proposed lease modifications are located within the North Fork of the Gunnison River basin.

Surface Water Resources

The East Fork of Minnesota Creek, just west of the lease modification area, and Deep Creek, just northeast of the modification area, drains to the North Fork of the Gunnison River. The North Fork of the Gunnison River joins the Gunnison River downstream of Hotchkiss. There are two USGS monitoring locations along this reach: North Fork of the Gunnison River near Somerset, Colorado (Station No. 09132500), and North Fork of the Gunnison River below Leroux Creek, near Hotchkiss, Colorado (Station No. 09135950). Stream flow has been monitored at the station near Somerset since October 1933. The drainage area at the Somerset station is 526 square miles.

Surface water quality in the North Fork of the Gunnison River in the vicinity of Paonia is good with low concentrations of TDS, nitrate, nitrite, and metals. The water is of calcium bicarbonate type.

Project Area Surface Water Hydrology

Figure 3.7 shows the watershed areas that encompass the coal lease modifications. The Sunset lease modifications are drained by Lick Creek, South Prong Creek, and Horse Creek, all of which drain into the East Fork of Minnesota Creek, west of the lease modifications. A small portion of the lease modification (~60 acres) drains to the northeast into Deep Creek. These drainages eventually empty into the North Fork of the Gunnison River.

Lick Creek is an intermittent drainage. Flows within this channel are influenced mostly by spring runoff conditions with a measure peak flow of around 3 cfs (HYDROGEO, 2009), with zero flow conditions typically occurring August-March. South Prong Creek and Horse Creek, as reported by MCC data, are ephemeral and flow only in response to spring runoff conditions and storm events.

Surface Water Quality

Baseline water quality and flow data for the West Elk Mine has been collected for several years. The existing West Elk hydrologic monitoring program which the lease modification could influence include continuous flow monitoring at the Lick Creek Flume, and the Upper Deep Creek Flume, and the Upper Minnesota Creek (USFS gauging station). These gauging stations are sampled three times per year for field water quality parameters (pH,

EC, and temperature), and sampled once per year for laboratory water quality analysis. In addition to these stream gauging stations, the spring and seep monitoring program monitors flow, field water quality, and laboratory water quality from several springs in the area immediately west of the proposed lease modifications (Figure 3.7). Further information can be obtained from project and district files or from the mine in their Annual Hydrology Reports.

From previous management activities (Section 3.1), no significant adverse effects to surface water rights, surface water quality, or surface water quantity have been documented at the West Elk Mine.

Seasonal Trends in Surface Water Quality

Changes to general seasonal trends in surface water quality were not obvious in reviewing the MCC water quality data. The relatively short period of record (approximately 10 years) likely explains the lack of significant trends. In general spring run-off from snow-melt significantly increases the sediment load and transport within the surface water system. Flows also increase dramatically during this period from March – June.

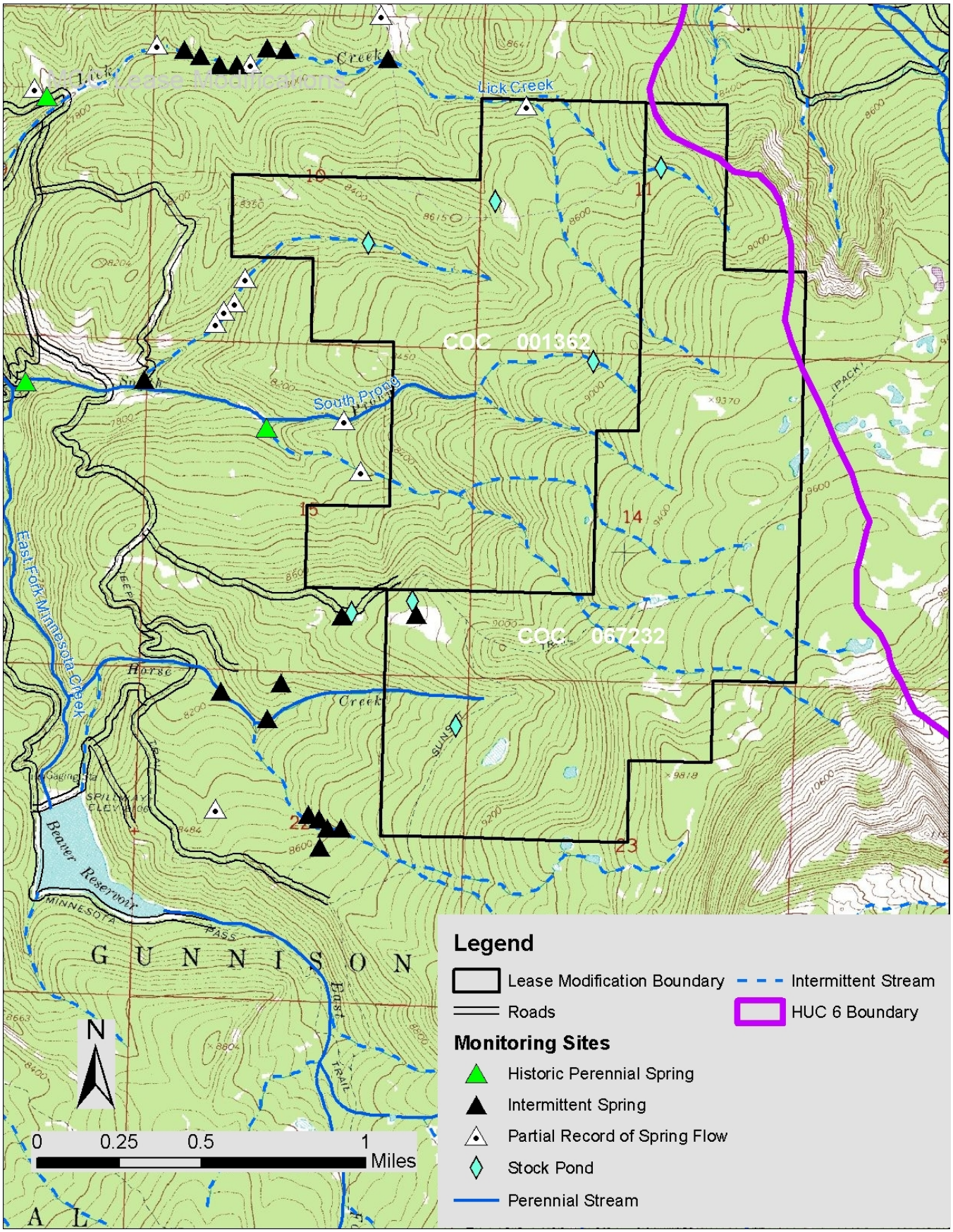
The Forest Service does not have any water resource allocations in the modification area. USFS and MCC records also identify 6 ponds created for livestock use within the modification area.

Influence of Past Mining on Surface Water

Various National Pollution Discharge and Elimination System (NPDES) permits granted to MCC regulate impacts of current and historical mining on local streams.

Monitoring on the North Fork of the Gunnison River shows little impact to the water quality from current or historical mining. Subsidence impacts from past mining have been observed in several areas where overburden is less than 500 feet thick. Although subsidence has been observed in the form of cracks in the weathered bedrock and colluvium from 15 to 100 feet in stream channels, there were no cracks observed in saturated alluvium underlying these streams. There was also no evidence of loss of flow observed.

Figure 3.7. Water resources.



Groundwater Resources

Shallow groundwater resources in the lease modification area are limited due to geomorphologic controls imparted from the relatively steep gradients and stream profiles of drainages in the area, resulting in relatively thin alluvial/colluvial deposits confined to the bottoms of drainages. Groundwater that surfaces as springs and seeps in the tracts is associated with these shallow alluvial/colluvial deposits and does not appear to be hydrologically connected with deeper bedrock aquifers. There are no alluvial/colluvial monitoring wells in the area that are currently monitored as part of the West Elk hydrologic program.

Bedrock groundwater resources in the area are limited to isolated perched lenses and fracture/fault zones. Age-dating chemical analyses from the West Elk monitoring program have shown that bedrock groundwater resources in the vicinity of the mine are part of a deep inactive system that is not in direct contact with near-surface water (USDA Forest Service 2003).

Groundwater may also be present to a limited extent within coal seams. Bedrock and associated coal seams dip to the northeast, with the upper most strata outcropping along the North Fork valley. The occurrence of groundwater springs in the North Fork outcrops of the Mesa Verde formation are rare. The BLM and MCC report that the coal seams in the West Elk Mine area are typically dry, with average moisture content of 5%. Groundwater discharges from faults intercepted by longwall panels in the West Elk Mine typically experience an initial high volume discharge periods followed diminishing to negligible flow within a short time period. Mine under-drain and mine inflow sites are currently monitored for flow and water quality by the West Elk hydrologic program. The total inflow for the West Elk Mine is approximately 34.26 acre-feet per year (HydroGeo, 2009). It is assumed for this analysis that any water bearing faults that are intercepted by the proposed longwall panels in the lease modifications would flow 1,000 gallons per minute (gpm) or less when encountered then decreasing to negligible flows (Koontz 2003). Any groundwater encountered would be handled by the existing system in the MCC underground operation. Discharge water would be required to meet the NPDES and Colorado Discharge Permit System (CDPS) surface water quality goals.

Springs in the area typically show the same seasonality as the stream system. There are no known perennial springs, and only two intermittent springs inventoried for the lease modification area (Figure 3.7). Just west and north of the modification area, MCC currently maintains data on several additional springs and 2 hydrographs (Lick Creek, and Upper Deep Creek; see Figure 3.7).

Influence of Past Mining on Groundwater

A summary of water quality data is presented in MCC's Annual Hydrology Report and Annual Mine Inflow Report located in the project file. Review of MCC's water quality data from monitoring wells and springs does reveal small changes in general seasonal trends in groundwater quality at the study area. Some springs can show slightly elevated TDS/TSS, iron, and conductivity values; however, this was attributed to higher spring runoff values (HYDROGEO, 2009).

Past and current mining activities have affected groundwater quantity and quality. For example, historic mining activities at the King Mine in the drainages below the Bowie No. 2 Mine have impacted the local alluvial groundwater quality. Seepage from the King Mine has caused high sulfate and other trace constituent levels in groundwater at the down gradient alluvial monitoring wells. At the West Elk Mine, small changes in groundwater quality have been noted after mining has occurred in certain areas. As noted in the Annual Hydrology reports, these impacts have been slight changes in pH, or slightly elevated iron, manganese, and/or conductivity measurements (HYDROGEO, 2009).

Past and current activities other than mining have also affected groundwater quality. Livestock grazing causes minor impacts to springs and seeps due to erosion, sedimentation, and water quality (i.e. fecal coliform). Unauthorized off-road vehicle use also causes erosion and sedimentation that effect spring areas. Individual domestic water wells and community water wells have had limited impact on groundwater quantity.

Groundwater Use

Water rights and well records from the Colorado Division of Water Resources were reviewed for the area of the proposed coal lease modification area. There are no water rights or diversions associated with springs or streams in the lease modification area.

There are no known decreed springs in the immediate vicinity of the lease modifications.

Alternative 1 Environmental Effects

Under the No Action alternative, there would be no mining-induced effects on water resources in the modification area. Current ongoing activities in the watershed as well as natural variation in spring, seep, and stream flow would continue to occur based on climatic variations.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Surface Water

Subsidence resulting from longwall mining can be expected anywhere above or within the angle of draw of fully extracted longwall panels (see Section 3.2 on Subsidence). Measurable subsidence effects for the modification area are expected to attenuate within 250 feet from the edge of the longwall panels (assuming a 25 degree angle of draw).

Based on subsidence studies and observations from the West Elk Mine measured subsidence values in the North Fork Valley are typically less than predicted subsidence magnitudes (Agapito 2005).

Subsidence may affect escarpments or marginally stable formations by inducing movement, tilt, or fracturing possibly resulting in rockfall and debris flows, or landslides. The West Elk Mine is currently using pre-mining survey data to assess this potential. Other natural factors separate from subsidence, such as periods of intense precipitation or runoff due to rapid snowmelt, may trigger or accelerate mass wasting events in the lease modification area.

Subsidence may alter surface water and groundwater hydrology by altering groundwater flow regimes, surface water drainages, seeps, and ponds. Subsidence in surface water drainages could result in changes in channel morphology and gradient thereby affect water quality by inducing minor cutting, pooling, soil erosion, and sedimentation. Surface tension cracks have the potential to develop within the surrounding surface drainages resulting in an initial period of erosion and sedimentation after during the initial periods of runoff after subsidence occurs. However, the potential for surface fractures to develop in drainages where unconsolidated materials occur will be partially mitigated by the ductile nature of the unconsolidated alluvium/colluvium (Agapito 2005).

Surface tension cracks in areas of bedrock cover may also intercept precipitation. It is expected that the crack would temporarily divert precipitation away from the drainage, but that given the limited depth of tension cracks the flow would remain in the drainage (USDA Forest Service 2003). In addition, surface and groundwater resources may be temporarily interrupted related to drainage into fractures that develop, however these fractures tend to be short lived, terminate at a shallow depth, and quickly fill with sediment. Given the ephemeral and seasonal nature of the surface drainages as well as their steep gradient, and influences of the natural geologic instability of the area (landslide potential and high erosion rate/sediment load) of the area, subsidence would have minimal long term impact on channel morphology and function. Surface and groundwater impacts will diminish rapidly and uniform during longwall retreat, as cracks associated with the longwall face will tend to closed after the face passes and open surface cracks that remain are normally not significant conduits to surface water. This is due to the fact that they tend to die out a depth (maximum 200 feet) due to the location of the neutral surface and crack intersection with soft material (Agapito 2005).

Cattle stock ponds could potentially be affected by mining–induced subsidence; however the potential for fractures developing underneath the stock ponds and their feeder ditches will likely be mitigated by the pliant characteristics of surrounding soil (Agapito 2005). Any damage to stock ponds or their related drainages would likely be localized and readily repairable.

Water usage from the National Forest for mining would be relatively minor and quantities would fall below the Forest's Biological Opinion for water depletions associated with minerals activities.

Water discharge from the mine to surface streams could impact the quality of water in the receiving streams. Mine effluent would be regulated, and any discharge to receiving streams would have to meet permitted effluent requirements. Concentrations of TDS, iron, manganese, and sulfate could be constituents likely to increase.

Groundwater

Subsidence induced impacts to groundwater resources were calculated from the reasonably foreseeable development scenario and generalized overburden strata characteristics for the lease modification area. It was also assumed that coal would be extracted using longwall mining techniques so that subsidence occurred within the limits identified in Figure 3.2.

During expansion of the West Elk Mine into the lease modifications, groundwater within the Mesa Verde formation may be encountered in faults and coals seams. After completion of mining, groundwater may infiltrate into voids and collapse features and affect water quality. However, no discernible effects to local groundwater quality have been observed at the West Elk Mine nor are they expected (HydroGeo 2003, 2009).

It is difficult to assess mining related effects of groundwater interception and withdrawal on regional water supply due to on-going drought conditions in the region. Climatological data from the West Elk Mine's Annual Hydrology Reports also indicate corresponding low averages over the period of record for annual precipitation and annual snow water equivalent for the North Fork watershed. Chemical analyses from the West Elk monitoring program have shown that deep groundwater resources in the vicinity of the mine are part of a deep inactive system that is not in direct contact with near-surface water, thereby limiting any potential effects to surface water flow.

Groundwater inflow from faults intercepted by longwall panels in the West Elk Mine typically experience an initial high volume discharge periods followed diminishing to negligible flow within a short time period. The total inflow for the West Elk Mine in water year 2009 was 34.26 acre-feet (HydroGeo 2009).

There are several springs inventoried in the modification area. Shallow groundwater in the modification area is limited due to geomorphologic controls from the relatively steep gradients and stream profiles of drainages, resulting in thin alluvial/colluvial deposits confined to the drainage bottoms. Groundwater that surfaces as springs and seeps in the area is associated with these shallow alluvial/colluvial deposits and does not appear to be hydrologically connected with deeper bedrock aquifers. Static water levels in bedrock aquifers in the West Elk Mine area are many hundreds of feet below ground surface and show no connection to surface water sources. There is low risk of alluvial/colluvial springs being intercepted by subsidence-induced tension fractures. The lowering of the land surface may cause springs to migrate a few feet, but no discernable loss of water is anticipated.

Groundwater may also be present to a limited extent within coal seams. Bedrock and associated coal seams dip to the northeast, with the uppermost strata outcropping along the North Fork Valley and areas like the Deep Creek slides. The occurrence of groundwater springs in the North Fork outcrops of the Mesa Verde formation is rare.

No effects to surface water resources have been documented from interception of water-bearing faults underground. Not all faults encountered during mining have contained water. Mine under-drain and mine inflow sites are currently monitored for flow and water quality by the West Elk Mine hydrologic program.

Any groundwater encountered would be handled by the existing system in the underground operation. Discharge water would be required to meet the NPDES and Colorado Discharge Permit System (CDPS) surface water quality standards. It is difficult to assess mining-related effects of groundwater interception and withdrawal on regional water supply due to ongoing drought conditions in the region. Yearly decreases in annual stream flow in both East Fork of Minnesota Creek and the North Fork of the Gunnison River during the period between 2001 and 2009 document ongoing drought conditions.

Longwall mining development of lease modification would induce subsidence of the overlying ground surface. The extent, severity, and potential impact to groundwater due to subsidence is dependent on the thickness, composition, and geotechnical properties of the overburden, thickness of the mined coal, and mining plans. Figure 3.2 illustrates the potential areas of mining induced subsidence impacts to water resources.

Longwall mining development in the E seam of the lease modification would induce subsidence of the overlying ground surface and temporarily dewater the strata adjacent to the coal seam. Mined areas would likely refill with water to approximate pre-mining levels after mining operations cease. This could impact groundwater quality through exposure to collapsed and abandoned mine workings. No subsurface water rights are located in the areas of potential impacts.

Subsidence could potentially disrupt or alter springs, seeps, ponds, and change local groundwater levels directly above the underground mine and within the angle of draw.

The potential for indirect groundwater impacts in the study area is expected to be minimal. In adjacent lands private domestic wells would be drilled and septic systems would be installed. Adjacent private lands could be mined and water resource impacts on those lands would be similar to that described above. Appropriate state and county regulations would have to be followed, minimizing impacts to groundwater quantity and quality.

Stipulations

Other than the water depletion which will be addressed in the Threatened and Endangered Species Section, no new stipulations other than those listed in the parent leases are recommended.

Cumulative Impacts

Leasing and the subsequent mining of the coal in the modification area would extend the life of the West Elk Mine, thereby increasing the potential for indirect impacts to surface water quality due to related subsidence under intermittent and ephemeral drainages and to springs/seeps within the area. If the lease modifications are granted effects similar to those described in Alternative 3 could occur on the adjacent private land while mining 5.6 million tons of private coal reserves and on parent leases where additional 3.3 million tons federal coal reserves may be mineable. However, current mining activity at the West Elk Mine has had no discernible localized effects to stream morphology, erosion rate, or suspended sediment load. High flows in intermittent and ephemeral surface water resources in smaller tributary drainages are limited to spring runoff and very large thunderstorm events; therefore, subsidence-induced impacts in these drainages would be minimal.

Due to the overriding influence of continued drought in the North Fork basin and the fact that creek flow is unlikely to be affected by subsidence or mine operations; it is unlikely that water resource allocations for the greater watershed will be impacted.

Potential post-lease surface use (exploration drilling, methane drainage) has the potential to affect surface water through surface disturbance related to drill pad and road construction on both federal coal leases and on adjacent private lands. Depending on location of these activities, construction could have impacts on sedimentation in stream channels; however, these effects are able to be mitigated through use of best management practices, including sediment control. The strata are not uniformly saturated, so there is little concern for inter-aquifer communication for installing methane drainage wells or exploration wells as they would be of small diameter and would cause little disturbance to the geologic strata. Methane release from coal mines would not be expected to impact domestic water wells because the wells are below the coal seams to be mined.

Accidental fuel or solvent spills from post-lease activities or through activities on private lands could impact shallow groundwater locally and surface water. Any proposed post-lease activities related to coal operations would be analyzed under a separate process if/when activities are proposed.

Agriculture is an important and significant activity in the North Fork of the Gunnison Valley. Cumulative effects to surface water quality would be minimal in the North Fork of the Gunnison River Valley.

Minimal logging is anticipated in this area in the future. Based on experience in the area, impacts to surface water would not be expected from small timber sales. Recreation is fairly limited in the area due to the lack of developed recreational facilities. Hunting is the primary recreational activity in this area, and impacts to streams from four-wheeling activity can result in increased sedimentation and damage to drainage channels.

Consistency with Forest Plan and Other Laws

The quantity of water for reasonably foreseeable future development is within the GMUG's blanket consultation with USFWS for depletion associated with the Upper Colorado River System. All action alternatives are consistent with the Clean Water Act and Forest Plan standards for water resources, and the FS Region 2 Water Conservation Practices Handbook and Ground Water Management FSM 2880.

3.8 Vegetation

Affected Environment

R2Veg GIS data as of 04 Feb 2010 was used in this analysis to describe existing vegetation within the project area. Due to the extent of aspen decline in the area, the aspen components of the R2VEG model are suspected to be outdated and may not reflect current actual conditions in aspen stands impacted by the project. It is anticipated that additional aspen will decline in 2012 and beyond. The cumulative effects analysis area for vegetation is coincident with the Mount Gunnison Lynx Analysis Unit boundary (described in more detail in Section 3.10) and totals 47,904 acres of NFS lands. Existing vegetation at the two potential analysis scales (lease modification area and NEPA cumulative effects area), is shown in Table 3.8a. Table 3.8b shows vegetation structural stages within the lease modification area. Figure 3.8 shows the vegetation in the lease modifications area.

Figure 3.8. Lease Modification & Cumulative Effects Area Vegetation Data

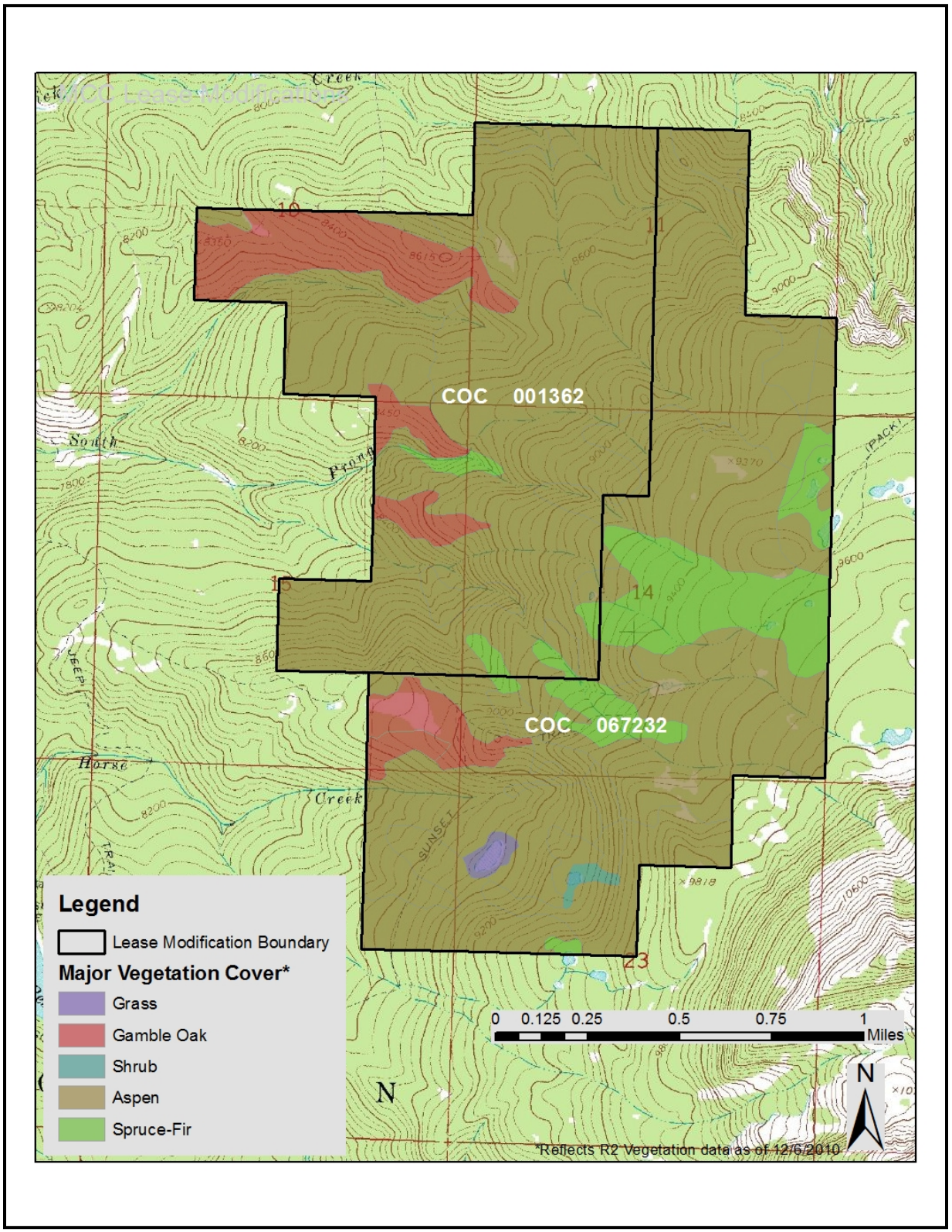


Table 3.8a. Lease Modification& Cumulative Effects Area Vegetation Data

Primary Vegetation Type (R2Veg Cover Type)	Acres within lease modification area	Acres in cumulative effects area (Mount Gunnison LAU)
Forb		168.7
Grass	7.3	726.6
Bare ground	4.9	3333.5
Gambel oak (shrub)	157.0	15210.2
Mountain shrub	<0.1	2013.6
Mountain mahogany		54.5
Willow (shrub)		348.5
Aspen	1393.3	17,183.5
Cottonwood		16.1
Douglas fir		31.2
Pinyon-juniper		624.0
Ponderosa pine		109.4
Spruce-fir	156.4	8016.4
Water		68.0
Total	**1718.9**	**47,904.3**

Table 3.8b. Vegetation Structural Stages, lease modification area (All vegetation types)

Vegetation Structural Stage	Potential Treatment Area (acres) rounded to nearest acre
Natural meadow	4
Natural shrubland	162
Grass/forb to sapling/pole cover <40%	22
Sapling/pole cover 40-70%	5
Sapling/pole cover >70%	0
Mature/overmature, cover <40%	30
Mature/overmature, cover 40-70%	6
Mature/overmature, cover >70%	1486

Vegetation communities in the proposed lease modification area are primarily aspen or mixed aspen/spruce-fir stands, with spruce-fir at higher elevations and Gambel oak at lower elevations, with smaller inclusions of grass, mountain shrub mix, and bare ground within the area. Riparian areas, including seasonal slump wetlands, ponds, and permanent wetlands, occur in and near the project area. For the purposes of this analysis, as the road and pad locations have not yet been determined, the impacts of those surface activities are assumed to be proportional to the available surface vegetation proportions on the landscape for the three major types (Gambel oak/shrub, aspen, and spruce-fir). Lease stipulations and Best Management Practices (BMPs) prevent pads and roads in wetlands except for crossing of drainages for access. Actual surface activity may be different than that analyzed; further analysis may be needed to compensate for changes when the surface operations may be proposed. However, at this time, and based on previous experience with these types of activities on the district, it is not anticipated that changes in actual surface disturbance would impart major changes.

Alternative 1 Environmental Effects

No direct or indirect human-caused change in existing condition of current vegetation and habitat is anticipated if No Action is undertaken for this project. Conditions will continue as they currently exist, modified as per the other

actions given in the cumulative effects contributions described herein and existing natural processes. Within the last five years (2005-2010) the aspen within the Paonia district has suffered substantial declines. Statewide, surveys have documented the decline on approximately 17% of the aspen in the state of Colorado, as of 2008 (http://www.fs.fed.us/r2/fhm/downloads/sad_faqs.pdf). These processes are expected to continue into the future.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

The lease modification carries no direct effects with it. It does, however, commit the lands in within the modification area to potential future mining, and that mining may result in subsidence of surface topography as coal is removed from below. This subsidence has resulted in minor landslides and other surface changes on unstable and steep slopes in other portions of the Forest in which such mining has occurred that have affected vegetation. Such disturbance, however, has been limited to steep and unstable ground and has not been widespread in undermined areas. Most surface subsidence has been relatively uniform across the landscape and in most areas does not visibly alter surface features or vegetation.

The area of impact would therefore include all 1721 acres of various habitats. However, the likelihood of this is minimal, and only small areas (approximately 1 acre) of subsidence in unstable areas are anticipated. If no vegetative habitat is lost due to subsidence, which is the expected outcome, then the lease modification and associated underground mining would have no effect on the habitat at the surface and there would be no effect as a result of subsidence.

However, underground mining may require surface facilities for safety, specifically methane drainage wells (MDWs). The RFMP provides information on potential surface activities associated with the underground mining within the lease modification area, including the number of MDWs required in this area and the approximate mileages of temporary roads required to access and construct these MDWs, as well as information on the longevity and rehabilitation of surface disturbance. This plan is described at the beginning of this chapter and is being analyzed concurrently for the purposes of this evaluation.

The plan does not have specific locations for the MDWs and associated roads which comprise the surface disturbance. It does, however, indicate the expected acreage of disturbance required to operate the mine, approximately 72 total acres. Without knowing exactly where the MDWs and roads will be placed, it is reasonable to assume that the proportion of loss of habitat associated with this activity is equal to the proportion of existing habitats within the lease modification area (Table 3.8a). The resulting habitat loss would therefore equate to approximately 7 acres of oak, 61 acres of aspen, and 7 acres of spruce-fir, with approximately 1 acre of other surface types.

The roads and well pads will result in complete loss of existing vegetation community within the footprint of same (pads of approximately 1 acre in size and road widths averaging 30') for the life of the project. MDW pads and roads are not expected to be built all at one time. Activity on the parent leases has been to construct pads and associated access roads in advance of the longwall position, and then rehabilitate once the mining has moved past that point. In effect, the construction proceeds in rows of MDWs. After the mining is complete, these areas will be re-contoured and revegetated with grasses and forbs for erosion control in the short term, and are expected to revegetate to types consistent with their pre-disturbance condition in the long term. This project will therefore not remove habitat permanently from the landscape, but will remove it in the short- and mid-term.

Lease stipulations will mitigate impacts due to creation of roads and pads within the area and vegetative changes. The stipulations are shown in Chapter 2.

Cumulative Effects

The FACTS (Forest Service Activity Tracking System) database was used to determine past federal actions in the area which may have impacted wildlife habitat. Previous MDW and road construction activities are beneath the

resolution of the system and are not reflected therein. Within the past ten years, a total of 2550 acres of other habitat alteration has occurred within the larger cumulative effects area, associated primarily with big game wildlife habitat improvement projects, with the majority occurring in oak and juniper habitats. These acres reflect some re-treatment of areas due to multiple entries for a single project, as well, so that less than 2550 acres of the landscape have been actually treated. Table 3.8c shows the individual actions which have occurred within the area in that time frame. There has been no timber harvest in this area within the last ten years, and any prior activity is incorporated into baseline habitat values for the area.

Table 3.8c. Vegetation management within the cumulative effects area since 2000.

Type of Treatment	Acres	Year
Deer Creek Shaft and E Seam MDW projects (minerals)	>54 proposed	2007-current
Sylvester Gulch and Box Canyon projects, Dry Fork coal lease project (minerals)	>71 proposed	2004-current
Lamborn Wildlife Habitat Improvement (Rollerchop)	116	2009
BearPaw Rx Burn	983	2011
Lone Cabin Mechanical (hydro-axe)	78	2007
BearPaw Rx Burn	561	2004
Wooten Mesa Roller Chop	158	2003
unnamed rollerchop	26	2003
Sams Divide Rx Burn	628	2002
Total	**2550**	

Other federal actions which have occurred in the past and are expected to occur in the future which impact vegetation include additional wildlife habitat improvement projects (more Lamborn Wildlife habitat improvement projects in oak and similar habitats), permitted livestock (currently cattle) grazing and permitted outfitter/guided hunting. Road and trail maintenance is expected to continue within the area. Travel management activities including closing existing roads and trails may occur in the near future which restores vegetation. Non-federal actions occurring in the area within the last ten years include dispersed camping primarily associated with hunting (approximately 70 known sites), and nonspecific dispersed recreation. Water development (reservoirs, ditches) occurs on both federal and private lands in the area, including three irrigation reservoirs totaling 68 surface acres. On private lands, single family habitation, ranching including hay production, mining activities, and livestock grazing are the primary uses within the area.

If the lease modifications are granted effects similar to those described in Alternative 3 could occur on the adjacent private land while mining 5.6 million tons of private coal reserves and on parent leases where additional 3.3 million tons federal coal reserves may be mineable.

Consistency with Forest Plan and Other Laws

Proposed Action would is consistent with the 1991 GMUG Forest Plan.

3.9 Threatened & Endangered Species

A Forest species list was provided by the US Fish and Wildlife Service on 9 May 2008 (USDI 2008b). There is only one federally listed species that has the potential to be found in the project area, the Canada lynx. Other species considered are shown in Table 3.9. As these species do not occur in the project area and no habitat for them will be impacted by the project, these species were not further analyzed in this document. These species would all have no effect determinations.

Table 3.9. Federally Threatened and Endangered or Candidate Species considered for this project.

Species	Scientific Name	Habitat Description and Requirements	Habitat in Project Area?
Canada Lynx	*Lynx canadensis*	Spruce/fir, mixed conifer, lodgepole pine forest (primary), or mixed deciduous/conifer (secondary).	Yes
Mexican spotted owl	*Strix occidentalis lucida*	Desert canyons, ponderosa forests. Not known or expected to occur on the Paonia RD.	No
Uncompahgre fritillary butterfly	*Boloria acrocnema*	Above treeline, closely associated with larval host, snow willow. Not known or expected to occur on the Paonia RD.	No
Debeque Phacelia (candidate)	*Phacelia submutica*	Specific clay-based soils of the Wasatch Formation in Piceance Basin, CO. Not known or expected to occur on the Paonia RD	No
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	Headwater streams and lakes, isolated headwater reaches with less than 30 cfs, gradients > 4%, above 7,500. Require year round stream flows to survive. Not expected in analysis area due to lack of perennial water.	No
Bonytail Chub	*Gila elegans*	Habitat not present, but water depletions associcated with MDW drilling may affect this species in the Upper Colorado River Basin.	No*
Colorado Pikeminnow	*Ptychocheilus lucius*	Habitat not present, but water depletions associcated with MDW drilling may affect this species in the Upper Colorado River Basin.	No*
Humpback Chub	*Gila cypha*	Habitat not present, but water depletions associcated with MDW drilling may affect this species in the Upper Colorado River Basin.	No*
Razorback Sucker	*Xyrauchen texanus*	Habitat not present, but water depletions associcated with MDW drilling may affect this species in the Upper Colorado River Basin.	No*
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	Coarse rocky soils above the current flood plains of the Colorado, Gunnison, and Green River drainages in western Colorado and northeastern Utah. Not known or expected to occur on the Paonia RD.	No

*Habitat not present, but consultation has occurred with USFWS regarding depletions associated with RFMP for post-leasing activities.

3.10 Canada lynx

The Forest Service vegetation database (R2Veg) data as of 04 Feb 2010 was used in this analysis to describe existing vegetation and habitats within the project area. Sudden Aspen Decline (SAD) is impacting mature aspen stands across the district, and declining stands have been identified in the immediate project area and across the analysis area. The current state of these stands is not reflected in R2Veg due to the rapid change in vegetation condition. It is anticipated that additional aspen stands will decline in 2010 and beyond, and that the affected aspen stands may constitute a much larger portion of the analysis area than they do currently.

Affected Environment

The analysis area for the Biological Assessment is the Mount Gunnison Lynx Analysis Unit, comprising 47,904 acres (Table 3.8a). Other scales of analysis may be used for other species Existing vegetation at two potential analysis scales (Lease modification area and LAU) is shown in Table 3.8a. Table 3.8b shows vegetation structural stages within the lease modification area. Acreages within the lease modification area in this analysis (1718.9) are slightly less than in the proposed action provided through the BLM office (1721) and represent differences in mapping versus information provided from outside the agency.

Environmental Baseline

The Canada Lynx was listed as threatened in March 2000. In August 2004, the Second Edition of the Canada Lynx Conservation Assessment and Strategy (LCAS) was released, to provide a consistent and effective approach to conserve Canada lynx on federal lands. The Canada Lynx Conservation Agreement (USDA FS, 2005) identifies the Science Report (Ruggiero et al. 2000) and the LCAS (Ruediger et al. 2000) as including the best available science on habitat and conservation measures. Both of these documents, along with local information were to be used for project analyses

Following release of the LCAS, the Forest mapped lynx analysis units (LAUs) and habitat within them, based on Regional direction. Habitat was mapped based on existing vegetation information, including vegetation type, canopy closure and size of trees. Areas outside of mapped LAUs are not considered to be lynx habitat, even though they may contain habitat components or stand similar to those within LAUs. The GMUG Forest Plan includes direction about limiting the amount of currently unsuitable habitat within a LAU to less than 30%. Currently, 0.5% of lynx habitat within the LAU is unsuitable. The project is within the Mount Gunnison LAU, and potential impacts of the project to lynx are limited to that LAU. Existing conditions of the Mount Gunnison LAU are displayed in Table 3.10a.

Table 3.10a. Mount Gunnison Lynx Analysis Unit Existing Condition (rounded to nearest acre)

LAU Name	Total Acreage	Suitable Habitat	Acres Currently Unsuitable Habitat (% of lynx habitat)	Acres Non Habitat (% of LAU)
Mount Gunnison LAU	47904	22614	0 (0)*	25290 (52.8)
Previous Actions*			125 (0.5%)	
Lease Modification Area	1718	1436	0	282
Reasonably Foreseeable Actions (surface acres affected)	73	≤73		

*Previous mining-related loss of habitat is beneath the scale of R2VEG and does not show up in the current GIS information.

Lynx breed in March and April in the north, and kittens are born in May and June in the Yukon (Ruediger et al. 2000). Den surveys in May and June 2005 in Colorado found kittens in the dens at that time (CDOW 2005a.) All of the 2005 dens were scattered throughout the high elevation areas of Colorado, south of I-70. Most of the dens were in spruce/fir forests in areas of extensive downfall. Elevations ranged from 10,226 to 11,765 feet for 2005 dens (CDOW 2005a) with a mean elevation of 3354 meters (11,001 feet) for all dens prior to 2009 (CDOW 2009). However, the project area is all below the elevation where denning has occurred in Colorado.

Lynx have been described as being generally tolerant of humans, including moderate levels of snowmobile traffic (Ruediger et al. 2000). In a lightly roaded study area in northcentral Washington, logging roads did not appear to affect habitat use by lynx. In contrast, a study in the southern Canadian Rocky Mountains found that lynx crossed highways within their home range less than would be expected (Ruediger et al. 2000).

Lynx have been reintroduced to southwestern Colorado, beginning in 1999. Tracking of these lynx indicate that lynx are using or moving through the Forest, but only a few of the relocations lie within or adjacent to the project area (CDOW 2005). Of the total 218 adult lynx that have been released in Colorado, there are 115 known mortalities (CDOW 2009). The cause of death is unknown for a third of these, but the two leading known causes of mortality are starvation and being hit by a vehicle. Speed has been identified as the primary factor contributing to vehicle-wildlife collisions (Gunther et al. 1998). Neither is considered to be a factor for this project due to the lack of suitable habitat in the project area. There are no landscape linkage areas in or near the project area or any travel routes associated with the project.

The Recovery Outline (USDI FWS 2005) identifies core areas, secondary areas and peripheral areas, based on historical and current occurrence records, as well as confirmed breeding. The Southern Rockies (Colorado and Wyoming) were identified as a Provisional Core Area. This designation was identified because this area contains a reintroduced population. Reproduction has been documented but it is too early to determine whether a self-sustaining population will result. A total of 37 dens and 116 kittens had been located in Colorado prior to the 2009 breeding season (CDOW 2009).

In November 2005, the FWS proposed critical habitat for lynx (USDI FWS 2005a). In 2006 Critical Habitat for the lynx was designated, with none occurring in the Southern Rockies (USDI FWS, 2006). A revised critical habitat designation which does not include lands within Colorado has been proposed (USDI FWS, 2008).

Extensive stands of pure aspen may not provide quality hare (primary prey) habitat due to deficiencies in winter habitat characteristics. However, when mixed with spruce/fir, aspen (especially younger stands) may substantially contribute to prey productivity (Ruediger et al. 2000). Lynx transplanted into Colorado were frequently located in well-developed riparian and valley wetland shrub habitats of the upper montane and subalpine zones. These ecotones may provide quality foraging habitat for lynx.

Lynx Standards and Guidelines from the GMUG Forest Plan are shown in Table 6 of the Biological Assessment found in the Project File.

Alternative 1 Environmental Effects

The direct and indirect impacts of the no action alternative would not change current habitat or population conditions of Canada lynx in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those related to Canada Lynx and TES species. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

For this analysis, all lease stipulations as described in Proposed Action in Chapter 2 are considered to be in effect.

The lease modification carries no direct effects with it. It does, however, authorize underground coal mining within the modification area, and that mining may result in subsidence of surface topography as coal is removed from below ground. This subsidence has resulted in landslides and other surface changes on unstable and steep slopes in other portions of the Forest in which such mining has occurred. Such disturbance, however, has been limited to steep and unstable ground and has not been widespread in undermined areas. Most surface subsidence has been relatively uniform across the landscape and in most areas does not visibly alter surface features or vegetation.

The area of impact would therefore include 1436 acres of lynx habitat, that being the portion of the lease modification currently suitable. These values are based on the R2VEG GIS coverage for this area and may not reflect recent impacts to aspen stands due to SAD.

If no habitat is lost due to subsidence, which is the expected outcome, then the lease modifications and associated underground mining would have no effect on the habitat suitability at the surface and there would be no effect to lynx as a result of the modification.

However, underground mining requires surface facilities for safety, specifically MDWs. There is a Reasonably Foreseeable Mine Plan which accompanied the request for lease modification, which at a gross level provides information on surface activities associated with the underground mining within the lease modification area, including the number of MDWs required in this area and the approximate mileage of temporary roads required to

access and construct these MDWs, as well as information on the longevity and rehabilitation of surface disturbance. This plan is described in the proposed action above and is being analyzed concurrently.

The plan does not have specific locations for the MDWs and associated roads which comprise the surface disturbance. It does, however, indicate the expected acreage of disturbance required to operate the mine, approximately 72 total acres. Without knowing exactly where the MDWs and roads will be placed, it is reasonable to assume that the proportion of loss of habitat associated with this activity is equal to the proportion of such habitat within the lease modification area (83.5%), or a total disturbance of 63 acres. However, it is possible that the entirety of the surface disturbance will occur within suitable habitat, for a total direct loss of 72 acres of habitat.

The roads and well pads will result in complete loss of habitat within the footprint of same (pads of approximately 1 acre in size and road widths averaging 30') for the life of the project. After the mining is complete, these areas will be re-contoured and revegetated with grasses and forbs for erosion control in the short term, and are expected to revegetate to types consistent with their pre-disturbance condition in the long term. This project will therefore not remove habitat permanently from the landscape, but will remove it in the short- and mid-term, certainly within lifetimes of both lynx and their primary prey.

Lease stipulations will mitigate impacts due to creation of roads and pads within the area, winter access, and vegetative changes. The stipulations are shown in section III of the BA (Project File) and their application to specific Forest Plan objectives and guidelines for human uses project such as the proposed action are indicated in Appendix 1 of the BA (Project File).

The following potential effects to lynx may include:

- Short-term direct effects of habitat loss / alteration
- Short-term direct effects from disturbance to denning or foraging
- Short-term direct effects of mortality from traffic or shooting
- Impacts from changes in winter access (competition and disturbance)
- Long-term direct effects as a result of changes in vegetation, which provides denning and foraging habitat

If the proposed action is implemented, 72 acres of suitable habitat could be directly lost through creation of roads and well pads within the LAU (0.3%). Past and current activities may result in the loss of 125 acres of habitat within the LAU, for a total of 200 acres of habitat lost within the LAU within the last ten years (0.8% of lynx habitat within the LAU).

If all of the lease modification area subsides to the extent that surface habitat is damaged or destroyed, an additional 1360.5 acres of habitat would be lost within the LAU, for a total of 1560.5 acres (6.2% of lynx habitat within the LAU). None of the other past, present, or reasonably foreseeable future activities within the LAU are anticipated to result in lost habitat or habitat effectiveness.

Disturbance to denning or foraging is possible if lynx are present in the area. This is not anticipated to be a substantial impact as the lease area is at lower elevation than denning has occurred in Colorado, there is abundant lynx habitat outside of the affected area, and lease stipulations for this project follow guidelines as noted in Appendix A of the BA (Project File).

Traffic is not anticipated to be a substantial impact. Roads used for this project will be low-speed routes and public use would be restricted. Roads will also be decommissioned after they are no longer needed, as noted in the lease stipulations. Winter access is not anticipated to be substantially increased over current levels as the area receives little recreational over-the-snow use and maintenance activities should be minimal.

Determination

Implementation of the project **"may affect, but is not likely to adversely affect**" the Canada lynx. The "may affect" is based primarily on the loss of suitable habitat in the project. Other impacts such as disturbance during denning or increased mortality risk are insignificant and discountable due to the distance of the project from typical Colorado denning habitat, and the low probability of loss of lynx from traffic or incidental shooting as a result of this project.

Cumulative Effects

Cumulative effects under NEPA

A new habitat model is proposed for the GMUG. Under that model, this project would alter 72 acres of the 22,614 (assumes no currently unsuitable habitat) acres of lynx habitat within the LAU (0.3%). Added to the 125 acres (0.5%) of habitat impacted under previous and ongoing actions, this would result in 0.8% of the suitable habitat in the LAU being rendered unsuitable.

Although future subsidence in not expected to affect surface vegetation, a worst case analysis would assume that all acres of habitat within the lease mod would be impacted by subsidence. In this event, a total of 1436 acres of suitable habitat (proposed habitat model) (6.4%) within the LAU will be lost in the short term but would be expected to regenerate.

At this time, no acres of the lynx habitat within this LAU are typed as currently unsuitable. However, previous and ongoing minerals activities within this LAU have been determined to render unsuitable 125 acres (0.5%) of habitat within the LAU (USDI FWS, 2007). These changes (road prisms and MDW pads) are beneath the resolution of the R2VEG layer and do not show up on it.

The FACTS (Forest Service Activity Tracking System) database was also used to determine past federal actions in the area which may have impacted lynx habitat. Again, MDW and road construction for mining activity does not show up in this system. Within the past ten years, a total of 2550 acres of other habitat alteration has occurred within the LAU, associated primarily with big game wildlife habitat improvement projects, and none of it in lynx habitat. These acres reflect some re-treatment of areas due to multiple entries for a single project, as well, so that less than 2550 acres of the landscape have been actually treated. Table 5 shows the individual actions which have occurred within the LAU in that time frame. There has been no timber harvest in this LAU within the last ten years, and any prior activity is incorporated into baseline habitat values for the LAU.

Table 3.10b. Vegetation Management within the Mount Gunnison LAU since 2000

Type of Treatment	FACTS ID	Acres	Date
Deer Creek Shaft and E Seam MDW projects (minerals)	N/A	54 (within lynx habitat)	2007-current
Sylvester Gulch and Box Canyon projects, Dry Fork coal lease project (minerals)	N/A	71 (within lynx habitat)	2004-current
Lamborn Wildlife Habitat Improvement (Rollerchop)	5807021001	116	2009
BearPaw Rx Burn	1102031002	983	2011
Lone Cabin Mechanical (hydro-axe)	1017331001	78	2007
BearPaw Rx Burn	1102031002	561	2004
Wooten Mesa Roller Chop	N/A (not in FACTS)	158	2003
unnamed rollerchop	1017311001	26	2003
Sams Divide Rx Burn	1102031001	628	2002
Total		**2550**	

Other federal actions which have occurred in the past and are expected to occur in the future include additional wildlife habitat improvement projects (more Lamborn Wildlife habitat improvement projects in oak and similar habitats, which are not lynx habitat), permitted livestock (currently cattle) grazing and permitted outfitter/guided hunting. Road and trail maintenance is expected to continue within the LAU. Travel management activities including closing existing roads and trails may occur in the near future (NEPA pending). Non-federal actions occurring in the area within the last ten years include recreational hunting , mountain biking and ATV use on existing roads and trails, dispersed camping primarily associated with hunting (approximately 70 known sites), and nonspecific dispersed recreation. Water development (reservoirs, ditches) occurs on both federal and private lands in the area, including three irrigation reservoirs totaling 68 surface acres. On private lands, single family habitation, ranching including hay production, mining activities, and livestock grazing are the primary uses within the LAU.

Cumulative effects under ESA

Cumulative effects for the Endangered Species Act include future non-federal actions which may impact this species. Past actions are included in the existing conditions described in the BA (project file) and the beginning of Chapter 3. Mining activities may occur on private lands adjacent to the lease modification, and may include MDWs and grazing in this area which may contribute to vegetation changes on private lands in the area. However, those lands are already modified through long-term human use, and continued grazing is not likely to alter the suitability of lynx habitat in this area from current conditions. Water development in this area (reservoirs and ditches) already exists, and future actions will continue use of existing facilities. Grazing and outfitting impacts are the same as above. Within the past ten years, a total of 2550 acres of vegetation management has occurred in the LAU, with a total of 125 acres of habitat rendered or planned to be rendered unsuitable. Other actions are either of insignificant and discountable impacts to lynx or their habitat (road and trail maintenance) or occur on already disturbed sites (special use permits). Recreational activities are not expected to be substantially altered by this project.

Consistency with Forest Plan and Other Regulations

The NFMA and the ESA require the Forest Service to manage wildlife habitat to maintain viable populations of native and desirable non-native wildlife species and conservation of listed threatened or endangered species populations (36 CFR 219.19). Additional guidance is found in FSM direction which states: *Identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the*

conservation of endangered, threatened, and proposed species (FSM 2670.31[6]). The ESA requires the Forest Service to manage for recovery of threatened, endangered, and proposed species and the ecosystems upon which they depend. A Biological Assessment has been completed and assesses the impacts of the proposed action on threatened and endangered species. The Forest initiated consultation with the FWS in 2010 and concurrence was received in June 2010.

3.11 Sensitive Species

For this project, federally threatened and endangered species were separated and are discussed in a separate Biological Assessment prepared in compliance with the Endangered Species Act, which can be found in the project record and summarized in the Threatened and Endangered Species section of this document. Forest Service policy also requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the NEPA process ensures that TEPS species receive full consideration in the decision-making process. A copy of the BE prepared can be found in the project record.

The Reasonably Foreseeable Mining Plans at the beginning of this chapter was considered in order to effectively analyze potential cumulative impacts, and potential post-lease activities on the land surface, the analysis also assumes a scenario of potential surface use.

Methodology for Analysis: Portions of the area have been surveyed previously for this project, by Monarch and Associates, a biological consulting firm and by Forest Service personnel. Aerial photographs, vegetation typing, and results of those surveys were used to determine preliminary species which may be impacted by the project, as well as species which may have needed further examination. Reviews were conducted to determine which species are known from the area or have suitable habitat present and could potentially occur. Primary sources included district wildlife sightings records, NRIS FAUNA corporate data, and information from species assessments prepared for Sensitive Species in Region 2 (USDA 2010b). Surveys for some species will be conducted subsequent to this analysis but prior to implementation, and if actual results of those surveys differ substantially from predicted values, additional analysis may be required, or specific design criteria or mitigations may need to be implemented to protect species.

The analysis area used for direct, indirect, and cumulative effects is the 1719-acre lease modification area and a 47,904-acre surrounding landscape area coincident with the Mount Gunnison Lynx Analysis unit, which incorporates the watersheds surrounding the project on FS lands. This area is used to provide data consistency across disciplines. Vegetation and activity information for areas outside of the Forest are of substantially lower quality than on Forest Service lands and may not be considered here due to the lack of data specificity. Indirect effects of this project to the species analyzed herein will likely be restricted to the immediate lease modification area. However, but the action is anticipated to include some road construction off of the lease modification area, and is connected to previously analyzed actions within the original lease areas, which are included in the larger landscape area. In addition, some species are impacted by road densities, disturbance, or changes in vegetation over larger scales. The analysis includes changes in vegetation cover types, as this proposed action would alter existing vegetation within the proposed road and pad locations in both the short and long-term.

HABCAP (Habitat Capability) modeling was not used for this analysis. It was developed as a comparative tool to model differences in habitat capabilities between alternatives by calculating changes in habitat types and structural stages. A Habitat Capability Index (HCI) for each species is determined from the relative amounts of particular habitat types within the analysis area, based on the species' uses of that habitat for various functions and at various times of the year. Other factors, such as road density, are included for some species such as elk. It estimates capability at a single point in time, and does not simulate change over time. Long-term changes in habitat are addressed in the discussion within this document. However, HABCAP is useful only for larger scale vegetation management projects such as timber sales, and impacts of this project at watershed scales would show insignificant changes in the model. HABCAP may show effects of this project due to road construction, but these roads will not be constructed and used at the same time, will only be open for a short time frame, and their effects, as driving routes, would be restricted to that time frame when each route is in use. The model is unable to clearly show this type of activity and was not deemed useful for that purpose.

Assumptions: For this analysis, all lease stipulations for the parent leases (See Chapter 2 Proposed Action), with slight modifications to reflect current management direction, were considered as part of the proposed action, and

all BMPs outlined in the Watershed Conservation Practices Handbook are assumed to be used as needed for the project.

General Sensitive Species Affected Environment

See Vegetation Section in this document for a description of the existing habitats and acreages affected.

There are several sensitive species that are or are potentially present in the project area. Information on distribution, dispersal capability, abundance, population trends, habitat trends, habitat vulnerability, and risks based on life history and demographics has been reviewed for USFS R2 Sensitive Species, and is available on Region 2's website (www.fs.fed.us/r2/projects/scp). This information has been incorporated where relevant, but extensive life histories of species are not described herein. The list of species reviewed for this project was taken from the Region 2 Sensitive Species Matrix (USDA 2010). This excluded R2 Sensitive Species which were not known or expected to occur on the GMUG. A list of all possible sensitive species on the Forest is given in Appendix 1. Numerous species which may occur on the GMUG NF, but are not known or expected to occur in the project area, due to absence of habitats or range limitations, were not carried forward for analysis, and will not be affected by the project. None of the sensitive plant species on the GMUG are known or expected to occur in the project area and will not be affected by the project. Fish species are addressed in a separate document.

As of the preparation of this DEIS, the American three-toed woodpecker is no longer considered a sensitive species. While this species is still expected to occur in the project area and project-related impacts are still as noted in the initial assessment, there is no legal requirement to specifically address this species at this time, and the detailed analysis in the initial assessment will not be addressed here.

The Hoary bat has been added to the Sensitive Species List.

All Sensitive Species Consistency with Forest Plan and Other Regulations

The FSM directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. National forests are then required to monitor sensitive species populations and prevent declines that could require listing under ESA (FSM 2670.32 (4)). The direction requires the Forest Service to manage the habitat of the species listed in the Regional Sensitive Species List to prevent further declines in populations, which could lead to Federal listing under the ESA. The alternatives discussed in this EIS would not result in a decline or reduction of viability of the populations of sensitive species identified to occur on the GMUG National Forests. A Biological Evaluation has been completed to assess the impacts of the alternatives on sensitive species. The Biological Evaluation is located in the project file.

3.12 American marten

Affected Environment

The American marten is known to occur on the Forest and evidence of its presence has been seen in the project area (Monarch 2010). Suitable habitat is present at higher elevations within the lease modification area and at similar elevations throughout the cumulative effects area. Martens show close association with mesic, dense coniferous forests with complex physical structure. Maternal dens and winter resting sites are associated with large snags, large logs, large live spruce/fir trees and squirrel middens. Timber harvest, and reduction of snags and logs, has altered landscape patterns and reduced habitat quality (USDA 2005a). A marten survey was conducted on the Grand Mesa during the winter of 1993-94 for presence/absence and habitat types in which marten were found. Marten were documented in all suitable habitats surveyed (mature spruce-fir) with track plates, and habitat conditions averaged 70% canopy cover and tree age of 150 years old. See 2005 Management Indicator Species Assessment for more information on populations and trends (http://www.fs.fed.us/r2/gmug/policy/).

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of American marten in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the

cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- Short-term effects of disturbance during construction
- Long-term changes to habitat

Marten tend to be shy but occasionally appear fearless of humans and may approach closely (Ruggiero et al. 1994). They are active at various times of the day and night and appear to be flexible in their activity patterns. Activities associated with this project may cause avoidance or may result in changes in activity patterns.

Studies of home range size of male martens shows a range 16 km^2 (Minnesota) to 0.8 km^2 in Montana (Ruggiero et al. 1994). Overall, marten home ranges are large by mammalian standards. Female home ranges are smaller and home range size also varies based on prey abundance. Assuming a mid-range home range size (8 km^2), that would be a home range size of approximately 3 square miles. Because this species appears to be generally tolerant of disturbance (they are commonly observed in ski areas and at cabin sites), and they would have abundant habitat outside of the disturbed area within their territory, disturbance is not an issue for this species.

Denning habitat includes natal dens and maternal dens. Young are born in March and April in natal dens, but may be moved to other dens by their mother. They leave dens at about 50 days (Ruggiero et al. 1994). Young born in late April would leave dens around mid-June. Suitable marten denning habitat is present in the project area and will likely be impacted by the project, with a complete loss of habitat suitability at road and pad locations in spruce-fir habitats, with a total impacted area in these habitats of approximately 7 acres. Lease stipulations associated with Canada lynx require replanting of spruce-fir as part of rehabilitation, so in the long term, this habitat will be regenerated which also benefit marten. Much of this area is snowbound until late May or early June and most construction activities would occur outside of the denning period for this species, reducing the risk of incidental direct mortality to denning individuals or immobile young.

Marten make little use of early successional types as they lack overhead cover, high volumes of coarse woody debris, small-scale complex vegetation patterns and result in a conversion to a moist cool site to a warm, dry site (and changes in prey densities) (Ruggiero et al. 1994). Martens will generally avoid forest openings, but studies have found them crossing openings of 10m (Spencer et al. 1983), to 40 m (Simon 1980) to 100 m (Koehler and Hornocker 1977) (in Ruggiero et al. 1994). They are routinely seen on the district crossing roadways (D. Garrison pers. obs.). Road openings created for this project will be approximately 10 meters wide, within the range of tolerance noted above.

Starting in 1997, as a result of Amendment 14 that outlaws traps and snares, there has been no legal recreational trapping for any furbearer species in Colorado. In 2001, the CDOW looked at opening certain furbearer species to box and cage trapping. Several species may now be legally trapped, but this does not include marten. Effects of changes in access to trappers and resultant effects on vulnerability of marten to trapping will not be analyzed further.

Determination

Implementation of the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing”. This is based on known presence of marten within the project area, the anticipated loss of suitable habitat by the project, and the slight possibility of

mortality or disturbance to marten denning or foraging as a result of the project. The negative effects from this project are of short duration and magnitude and do not result in a Forest-wide decrease in trends or deter from meeting the MIS objectives in the Forest Plan.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. No other activities, with the exception of recreational hunting and livestock grazing, occur within suitable habitat in the analysis area. None of the ongoing or reasonably foreseeable actions reduce the quantity or quality of denning or foraging habitats for this species in this area. Disturbance from these activities will remain similar to current and past levels.

3.13 Pygmy shrew

Affected Environment

The subspecies *Sorex hoyi montanus* may occur on the GMUG National Forest. In the Rocky Mountain Region, they appear to be strictly boreal. In addition, moist boreal habitats such as bogs and marshes appear to be preferred (Beauvais and McCumber 2006). According to Beauvais and McCumber, the literature addressing habitat use by montane pygmy shrews is decidedly sparse, it does present a consistent theme of "wet conifer forest" as the primary occupied landscape. In the Southern Rocky Mountains, all known capture sites are in upper montane or subalpine landscapes dominated by conifer forest and dense stream networks that interact with various bogs, marshes, and other wetlands. This type of habitat occurs on the eastern edge of the project area and extends eastward from there through a system of slump ponds at the base of Mount Gunnison. The shrews' den may be a burrow or shelter under a log, or may be located in the roots of old stumps. Females generally produce one litter per year, of typically 3-7 young (Beauvais and McCumber 2006). They may be present in the project area, but no small mammal surveys were conducted for this project and none are planned.

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of Pygmy shrew in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1including those related to subsidence and surface use. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential to affect this species or habitat include:

- Short-term potential for loss of individuals during construction
- Long-term changes to habitat

Spruce-fir habitat suitable for the montane subspecies of pygmy shrew is present within the project area, and would be converted to road and pad surfaces in the short term. This habitat should regenerate after project completion and reforestation.

Heavy equipment could easily kill or injure individual shrews during construction, and small mammals such as shrews are susceptible to road kill. Because only a very small proportion of the shrew's habitat may be affected by this project over the short-term, and the species' high reproductive rates, direct and indirect effects are anticipated to be low and insignificant.

Determination

Implementation of the proposed action "may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing". This is because this species is at risk for direct mortality during construction, and habitat would be affected over the short-term, offset by the abundance of habitat in the area and the species' high reproductive ability to replace lost individuals.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. None of the ongoing or reasonably foreseeable actions substantially reduce the quantity or quality of denning or foraging habitats for this species in this area at the landscape scale, and few of them have occurred in suitable habitats. Disturbance from these activities will remain similar to current and past levels.

3.14 Northern goshawk

Affected Environment

This species occurs on the GMUG. Nesting occurs in mature forest types (spruce-fir, lodgepole pine, ponderosa pine and aspen). Foraging habitat may include younger or more open canopy forests. The goshawk may be vulnerable to nest abandonment due to disturbance within the area. Alternate nests are commonly used, but nest tree fidelity was stronger in uncut forests compared to treated forests (USDA 2005a).

Table 3.14. Potentially suitable goshawk habitat on the GMUG by vegetation cover type and habitat structural stage.

Cover Type	1	2	3A	3B	3C	4A	4B	4C/5	Total
Aspen		4743	55301	211399	41446	23567	227148	176278	739881
Cottonwood Riparian			248	100		2530	1532	42	4452
Gambel oak		291383	472	82		416			292353
Mountain shrub		165073							165073
Sagebrush		101838							101838
Wet meadow	4573								4573
High elevation riparian (blue spruce)			101	242	560	234	597	836	2570
Douglas fir			3396	8226	2416	8848	16192	6590	45668
Lodgepole pine		758	7100	124674	54741	4658	49472	38887	280290
Pinyon-juniper			28542	37131	625	29956	39064	1554	136862
Ponderosa pine		251	10530	13060	94	42180	44102	965	111182
Spruce-fir		269	38910	99888	11933	72923	322729	201388	748040
Total acres	4573	564315	144600	494792	111815	185312	700836	426540	2632782

Cover Type	1	2	3A	3B	3C	4A	4B	4C/5	Total

1 – Open grassland; **2** - Shrub-seedling, **3A** - Sapling-Pole, Crown cover percent < 40; **3B** - Sapling-Pole, Crown cover percent ≥ 40 and < 70; **3C** - Sapling-Pole, Crown cover percent ≥ 70; **4A** - Mature and over mature, crown cover percent < 40; **4B** - Mature and over mature, crown cover percent ≥ 40 and < 70; **4C/5** - Mature and over mature, crown cover percent ≥ 70.

* Potentially suitable habitat derived from HABCAP modeling based on Hoover and Wills, 1984.

Based on actual known locations of nest sites, suspected breeding territories, and sightings, the northern goshawk appears to be well distributed throughout the GMUG in suitable habitat. Records of known goshawk nest activity on the GMUG show that numbers of breeding goshawks and nest success has remained relatively stable, although low over a 17-year period (USDA 2001). Breeding Bird Survey data show a slight increasing trend for this species in Colorado from 1980-2006 (Sauer et al. 2008).

The primary threat to goshawk populations is alteration of its preferred habitat from timber management practices. Although the goshawk uses a wide range of forest communities during the breeding season, it prefers mature and old growth forest for nesting and hunting. Although there is some evidence goshawks are resilient to forest fragmentation and can re-establish when cleared areas are reforested, the thresholds for population persistence have not been identified. Issues related to habitat alteration include forest fragmentation, creation of even-aged, monotypic stands, potential increase in area of younger age class, and loss of tree species diversity (Kennedy 2003).

There is one known territory in the proposed lease modifications and goshawks have been seen repeatedly in the upper Deep Creek drainage (J. Monarch, pers. comm. and D. Garrison, pers. obs.) and nests have been found in and near the COC-67232 lease modification. However, additional monitoring will be needed to determine whether or not these nests are active prior to any proposed surface disturbance. The area at the eastern edge of the proposed lease modification and the area immediately to the east of that are relatively flat and contain numerous openings and wetlands, and are similar to other occupied territories on the district. Much of the remainder of the lease modification area is suitable habitat, but less likely to contain a goshawk nest than the area described above, due to steeper terrain and lack of surface water. Surveys for goshawk are planned prior to initiation of surface activities.

The northern goshawk was addressed in the initial 2011 assessment, and was thought likely to occur in or near the project area. Subsequently, several unoccupied nests have been located in or near the project area, and that information, as it has been acquired, has been added to the project record. Surveys will continue to occur prior to and during project activities, if they are authorized. If goshawks are located in this area, the project will be implemented in accordance with the lease stipulations for this project, which are in compliance with standards and guidelines from the Forest Plan, specific to Northern goshawk.

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of Northern goshawk in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds and raptors. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- Short-term effects of disturbance during construction
- Short-term potential for loss of young during construction
- Long-term changes to habitat

Human disturbances to goshawk nests have been a suspected cause of nest abandonment (Reynolds et al. 1992). Alternate nests are used commonly, but Crocker-Bedford found yearly nest tree fidelity remained at 67% in uncut forests, while treated units dropped to 15-20%, even with no-cut buffers around the nests (USDA 2005a).

Braun et al. (1996) reviewed existing goshawk management guidelines. They found no studies of human disturbance on breeding goshawks, but felt that the recommendation to minimize human activities in the nest area during the breeding season was a reasonable, conservative approach.

Goshawks are known to occur in the vicinity of the project, but an active nest location(s) has yet to be determined.

Additional raptor surveys specific to goshawk are planned for this project. Lease stipulations provide protection to known nest sites, should one be located. This design feature would help reduce the potential for loss of young during nesting as a result of nest abandonment due to disturbance.

Implementation of the project is expected to result in the loss of 61 acres of mature aspen habitats in various stages of decline, which are currently suitable for goshawk foraging and nesting, if currently unoccupied. This is .01% of the total aspen habitat for the GMUG. An additional loss of 7 acres of spruce-fir habitat is also anticipated.

Determination

Implementation of the proposed action "may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing". This is based on the loss of 68 acres of suitable nesting and foraging habitat, mitigated by lease stipulations for timing restrictions if goshawks are located in the project area. The negative effects from this project are of short duration and magnitude and do not result in a Forest-wide decrease in trends or deter from meeting the MIS objectives in the Forest Plan.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. HABCAP modeling was not used to determine the impacts of this habitat alteration within the cumulative effects area, as the projected habitat losses are insignificant changes at this scale. If the aspen does regenerate in these areas, long-term suitability of the treated stands would return, however, as the stands matured.

The GMUG did an analysis of habitat trends on the Forest; aspen have stayed the same in the 1983 to 2000 period (USDA Forest Service 2005c). A current trend for aspen has not been done at the forest level. However, much of the aspen is in decline in the project area, and 13% of the aspen state-wide has declined since 2005. On the Paonia District, flights in 2007 showed aspen decline on 20,733 acres of 297,938 surveyed (Region 2 Forest Health GIS data). Of the area flown, approximately 122,000 acres was in aspen type (R2Veg, October 2007), thus approximately 17% of the aspen on the flown portion of the district was in decline at that time. The cumulative effects area currently contains more than 17,000 acres of aspen and 8,000 acres of spruce-fir (Table 3.8a).

3.15 Boreal owl

Affected Environment

This species is known to occur on the Forest. Boreal owls in this portion of the state are closely associated with dense coniferous forests, especially spruce-fir. This habitat occurs on the upper elevations of the lease modification area and in inclusions within aspen stands at lower elevations. There have been no owl surveys conducted on the project to date, and due to the inaccessible nature of the project area and snow conditions during optimal survey periods, surveys may not be physically possible to safely conduct prior to project implementation.

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions Boreal owl species in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- Short-term effects of disturbance during construction
- Short-term potential for loss of young during construction
- Long-term changes to habitat

This species is associated with spruce/fir habitats, similar to martens. As a result, approximately 7 acres of suitable habitat may be lost as a result of this project, and will not regenerate until replanted conifers mature. The low amount of habitat loss represents only a few individual territories. There is a risk that occupied nesting habitat may also be impacted, with resultant loss of young. However, the species may utilize other habitats for foraging, and may use the newly created openings of the pads and roads for this purpose. Creation of these openings would therefore benefit this species.

Determination

Implementation of the proposed action "may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing" for the boreal owl. This is due to the possible loss of approximately 7 acres of suitable habitat, and potential of loss of young during project activities, offset by increased foraging opportunities in the created forest openings.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. This area contains over 8,000 acres of spruce-fir habitats suitable for this species, and portions of the remaining area are also suitable for foraging. None of the ongoing or reasonably foreseeable activities within this area, when combined with the proposed action, are likely to contribute to long-term cumulative impacts to this species.

3.16 Olive-sided flycatcher

Affected Environment

This species is known to occur on the Forest. They primarily breed in spruce/fir forest, but use the forest-opening ecotone and are a colonizer of post-disturbance habitats. Openings, conifers, snags and an abundant insect food source are the crucial elements (USDA 2005a). They occur less regularly and less abundantly in deciduous or mixed aspen/conifer forests (Kingery 1998). This species shows a relatively stable trend in Colorado (Sauer et al. 2008). Olive-sided flycatchers are occasionally seen and/or heard on the district, in a variety of habitats, usually near water or large openings while foraging (D Garrison, pers. obs.). This species has been observed near the project area during surveys for other coal-related projects in these watersheds (Monarch 2009).

Alternative1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of olive-sided flycatcher in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- Short-term effects of disturbance during construction
- Short-term potential for loss of young during construction
- Long-term changes to habitat

The nest-building through fledging period runs from about June 5 through August 2 for this species (Kingery 1998).

This species is associated with spruce/fir habitats, similar to martens. As a result, approximately 7 acres of suitable habitat may be lost as a result of this project, and will not regenerate until replanted conifers mature. The low amount of habitat loss represents only a few individual territories. There is a risk that occupied nesting habitat may also be impacted, with resultant loss of young. However, the species may utilize other habitats for foraging, and may use the newly created openings of the pads and roads for this purpose. Creation of these openings would therefore benefit this species.

Determination

Implementation of the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing” for the olive-sided flycatcher. This is due to the possible loss of approximately 7 acres of suitable habitat, and potential of loss of young during project activities, offset by increased foraging opportunities in the created forest openings.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. This area contains over 8,000 acres of spruce-fir habitats suitable for this species, and the remaining area is also suitable for foraging. None of the ongoing or reasonably foreseeable activities within this area, when combined with the proposed action, are likely to contribute to long-term cumulative impacts to this species.

3.17 Flammulated owl

Affected Environment

This species is known to occur on the Forest. Flammulated owls have a strong association with ponderosa pine, but also use aspen forests in the montane life zone. Locally, ponderosa pine is widely scattered and most known owl locations are in aspen. This species is migratory, but shows high site tenacity by adults. As an insectivore, they can occur at relatively high densities compared to other owls (Hayward and Verner 1994, USDA 2005).

These owls depend on cavities for nesting, open forests for catching insects, and brush or dense foliage for roosting (Kingery 1998).

Flammulated owls are documented on other portions of the GMUG NF, utilizing next boxes (NRIS FAUNA database). No Breeding Bird Survey information is available for this species. There have been no owl surveys conducted on the project to date, and due to the inaccessible nature of the project area, surveys may not be physically possible to safely conduct prior to project implementation.

Alternative1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of flammulated owls in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- Short-term effects of disturbance during construction
- Short-term potential for loss of young during construction
- Long-term changes to habitat

These owls are very tolerant of humans, nesting close to occupied areas and tolerating observation by flashlight at night. The effects of mechanical disturbance have not been assessed, but moderate disturbance may not have an adverse impact on the species (Hayward and Verner 1994).

The territory occupancy begins in late April or early May, with fledging in mid to late July (Hayward and Verner 1994). Project activities, including removal of suitable habitat, are likely to occur during the nesting period, and may result in loss of nests and young. Implementation of the proposed action would result in the loss of 61 acres of suitable nesting and foraging habitat for this species (mature aspen). Regeneration discussion and assumptions are the same as for goshawk noted above. Avoidance of known sites, if possible, would reduce risks to this species in this area.

Determination

Implementation of the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing” for the flammulated owl. This is due to the loss of 61 acres of mature aspen habitat, and the potential for loss of nest sites and young during project activities.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. None of the ongoing or reasonably foreseeable activities within this area, when combined with the proposed action, are likely to contribute to long-term cumulative impacts to this species.

See the goshawk analysis above concerning trends in aspen in the analysis area and on the Forest.

3.18 Hoary bat

Affected Environment

This bat is known to occur on the Paonia Ranger District. In 2007-2009, mist-net monitoring of bats occurred throughout the district, at numerous locations. 51 hoary bats were captured at 8 separate sites, including two bats at a site in the Minnesota Creek drainage near the project area (unpublished data). In this area, hoary bats seem to be concentrated along stream courses containing larger cottonwood trees, which they are known to use as roosting locations (D. Garrison, pers. obs.). Survey data indicates the largest concentrations of these bats are on the larger stream courses throughout the district, such as Hubbard Creek, the Clear Fork, and West Muddy Creek. They forage along streams and at other water bodies such as stock ponds, where their insect prey is abundant (D. Garrison, pers. obs.).

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of hoary bat in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

While the project does not include any removal of cottonwood trees, the primary roosting sites of the hoary bat in this area, there is a possibility that bats may be roosting in aspens or spruce trees which may be removed as a result of the surface disturbance associated with methane drainage well and associated road construction for the mine. Therefore, there is a possibility, however slight, of disturbance during roosting, as well as loss of individuals or roosting habitat as a result of project-related activities. Loss of such roosting habitat would impact this species in the long term, until such habitat grew back. The potential for loss or degradation of foraging habitat along streams and at ponds in the area is considered negligible.

Determination

The proposed action may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing. This is based upon the discussion in the above paragraph.

Cumulative Effects

Cumulatively, loss of a few individuals or small amounts of roosting habitat, when combined with other projects in the analysis area as described in the EIS, are unlikely to impact populations in the area. Much higher quality habitat and larger concentrations of individuals occur at lower elevations along stream corridors with a large cottonwood component, and such areas have not been and will not be substantially impacted by projects conducted in the planning area.

3.19 Northern leopard frog

Affected Environment

This species is widespread and is known to occur on the Forest. Population trends are expected to be downward throughout much of their range. The formerly abundant northern leopard frog has become scarce in many areas of Colorado due at least in part to changes in habitat. The species is also susceptible to fungal infections which have been known to impact amphibian populations. Typical habitats include wet meadows, and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams and irrigation ditches (Hammerson 1999). Local habitats include stock ponds, reservoirs, slump ponds, seeps, and other riparian areas (D. Garrison, pers. obs.). During the wet season, leopard frogs disperse along aquatic and riparian corridors (USDA 2005a).

There are records of northern leopard frogs in Garfield, Mesa, Delta and Gunnison counties (Colorado Herpetological Society website). Leopard frogs are known to occur in the Minnesota Creek area (district records) and in other portions of the North Fork Valley. There are seventeen identified potential amphibian sites within the lease modification area, and more than 250 sites within the cumulative effects analysis area, in addition to permanent streams. Leopard frogs are known to occur at many of the sites within the cumulative effects area but surveys have not been conducted within the lease modification area itself. Surveys will be conducted in before surface disturbing activities are authorized, to determine frog presence/absence in the project area.

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of Northern leopard frog in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

The following potential effects to northern leopard frogs include:

- Short-term direct effects from construction (loss of individual adults, egg masses or juveniles)
- Impacts to water quality during and after construction

The northern leopard frog is known to occur in this watershed. During spring and early summer, egg masses and juveniles potentially residing in area streams or ponds may be subject to mortality through impacts to wetlands such as siltation or fuel spills. However, lease stipulations implemented in these types of projects make this unlikely. Adults may be killed through the action of heavy equipment during road and pad construction, or from traffic along roads leading to and from the project area. There is also a possibility that movement of tadpoles or adult frogs may be curtailed by placement of culverts at stream crossings. Breeding habitat for this species will not be lost as a result of this project.

Determination

Implementation of the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing” for the northern leopard frog. This is based on the possibility of individual mortality by vehicles or heavy equipment during construction, a low likelihood of water quality impacts, the presence of suitable habitat near the project area, and the lack of aquatic habitat loss associated with the project.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. Activities in this area which may impact leopard frogs include grazing management, surface activities associated with mining, motorized travel, and water depletions. Grazing can result in loss of riparian vegetation (foraging habitat and cover) and trampling of egg masses. However, frog populations have been located on the forest in areas with livestock concentrations (D. Garrison pers. obs.) and many of the suitable habitat features on the landscape, especially in this watershed, were created for and are managed for livestock use.

Water depletion can reduce habitat availability at breeding sites (ponds and riparian areas). However, seasonal drying of wetlands and breeding ponds is a common occurrence for this species. Additionally, the project area receives substantial amounts of precipitation and has abundant surface water at higher elevations. Surface activities associated with mining can result in runoff effects as noted above, but these are unlikely and have not, to date, shown any noticeable impacts to this species in this area. Motorized travel of all types may result in mortality to individuals moving from wetlands into upland areas. These impacts, however, all occur in this watershed and have for several years, and frog populations appear to be healthy. This project is therefore unlikely to contribute significantly to cumulative impacts for this species.

3.20 Purple martin

Affected Environment

This species is known to occur on the Forest and is primarily associated with patches of mature to decadent aspen. Nest site availability may be a key limiting factor to populations in R2 (USDA 2005a). The preferred habitat of purple martins in the Rocky Mountains is mature aspen forest with nearby meadows and open water. Martins nest in cavities in live aspen trees (Wiggins 2005). This species shows an upward population trend in Colorado but is relatively stable to slightly decreasing across the US (Sauer et al. 2008). Numerous colonies of purple martins are known on the district and martins are known to nest at lower elevations near the project area. Additional bird surveys will be conducted in this area prior to project implementation and any nest sites located near proposed surface disturbance activities would be avoided if possible.

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of purple martin in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- Short-term effects of disturbance during construction
- Short-term potential for loss of young during construction
- Long-term changes to habitat

The nest-building through fledging period runs from about June 6 through July 31 for this species (Kingery 1998). This species uses aspen habitats, similar to flammulated owls. Project activities, including removal of suitable habitat, are likely to occur during the nesting period, and may result in loss of nests and young. Implementation of the proposed action would result in the loss of 61 acres of suitable nesting and foraging habitat for this species (mature aspen). Regeneration discussion and assumptions are the same as for goshawk noted above. Avoidance of known sites, if possible, would reduce risks to this species in this area.

Determination

Implementation of the proposed action "may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend towards federal listing" for the purple martin. This is based on the loss of 61 acres of suitable nesting habitat in the project area and the quantity of aspen habitat remaining in the cumulative effects area.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. None of the ongoing or reasonably foreseeable activities within this area, when combined with the proposed action, are likely to contribute to long-term cumulative impacts to this species. See the goshawk analysis above concerning trends in aspen in the analysis area and on the Forest.

3.21 Sensitive Plants

Affected Environment

According to Paonia Ranger District Range Management Specialist, two Forest Service sensitive plant species, Rocky Mountain thistle (*Cirsium perplexans*) and Colorado tansy-aster (*Machaeranthera coloradoensis*) are known or likely to occur on or near the Paonia Ranger District. Species that are not known or not likely to occur in the project area will not be affected by the proposed action; therefore, they will not be discussed further.

Rocky Mountain thistle (*Cirsium perplexans*) is a western Colorado endemic found in dry, sparsely vegetated or disturbed areas associated with sagebrush, mountain shrub, Gambel oak/serviceberry, and saltbush shrubland vegetation types at elevations of 5,700 feet to 7,560 feet. It occurs adjacent to drainages and dry washes and along roads (Spackman *et al.* 2002). Rocky Mountain thistle loosely resembles the noxious weed Canada thistle (*Cirsium arvense*). Its primary threat is the use of biological control and herbicides in the management of non-native *Cirsium* spp. (Panjabi and Anderson 2004). Currently, there is insufficient evidence for Federal listing. Panjabi and Anderson (2004) documented an occurrence on the Paonia Ranger District on Land's End Mountain in 1997 (approximately 18 miles southwest of the project area). This species has been found at lower elevations on BLM land in the "Redtop Peak area" about 6 miles northwest of the project area. In addition, the Paonia District Rangeland Management Specialist has located numerous populations on the BLM Oak Ridge area and the GMUG NF Sam's Divide area 6 miles to the west of the project area. All known populations on or near the Paonia Ranger District have been found below 7,700 feet. This species has not been documented in the project area; however, habitat of this type likely occurs there.

Colorado tansy-aster (*Machaeranthera coloradoensis*) is a south-central Wyoming, and central, west-central and western Colorado endemic found in sparsely vegetated gravelly, exposed soils of sedimentary or volcanic origin (Beatty and others 2004). In Colorado, it is associated with dry grassland communities ranging from ponderosa pine (*Pinus ponderosa*) to alpine fellfields and meadows at elevations from 7,675 feet to 12,940 feet. The primary threats to this species are direct and indirect effects of motorized and non-motorized recreation, and trail and road construction and maintenance (Beatty and others 2004). Three occurrences were documented in Gunnison County in 1950, 1997, and 1999 (Beatty and others 2004, USDI BLM 2000). Occurrences of this species have not been documented in the project area but its habitat is likely to occur.

Alternative 1 Environmental Effects

The direct and indirect impacts of the "no action" alternative would not change current habitat or population conditions of any Forest Service sensitive plant species in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Under the Proposed Action, there would be no direct effects to sensitive species. Indirect effects from surface disturbance related to new road construction and MDW installation could affect sensitive plants if it happens to occur in the same location as a plant population. At time surface activities might be proposed, appropriate populations or habitats will be surveyed on a site-specific basis prior to ground disturbance.

Colorado tansy-aster has not been documented in the project area, and if encountered would not be impacted by the proposed action. If populations were encountered they would be avoided or have other mitigation implemented to avoid effects on plants or populations, where possible.

Rocky Mountain thistle may benefit from MDW and other associated surface disturbance by the creation of suitable habitat (Panjabi and Anderson 2004). If the species is present near an area of disturbance, it may be able to colonize newly disturbed areas. While this species may be adversely affected by off-road vehicle use or inadvertent targeting of the species as part of a noxious weed control program, these impacts are not likely to occur as a result any future proposed disturbance would require surveys in likely habitats before disturbance occurs and populations would be avoided or have other mitigation implemented to avoid effects on plants or populations, if possible. If surveys are required for future disturbances, any occurrence of Rocky Mountain thistle would be flagged and mapped to avoid inadvertent herbicide application during weed treatments and species identification information provided to the weed control agent to further decrease the likelihood of species misidentification. For these reasons, there will likely be a beneficial impact to this species in the creation of possible disturbance areas suitable for propagation.

Cumulative Effects

There is not anticipated to be any negative cumulative impacts from leasing or subsequent development on these species within the lease nomination area. Disturbances may increase potential habitat for Rocky Mountain thistle Existing activities outside the analysis area may continue to effect habitat and individuals of these species.

3.22 Management Indicator Species

The 1982 Planning Rule 36 CFR 219.19(a)(6) related to Management Indicator Species (MIS) requires the Forest Service to produce a unique list of species to represent Forest communities or ecosystems. These species and the ecosystems in which they represent must be considered for each project to evaluate consistency with the Forest Plan. The 2005 Forest Plan Amendment modified this list.

A complete table of all of the GMUG Management Indicator (MIS) species is presented in Appendix 2 of the Biological Evaluation in the Project File. The northern goshawk and American marten are also sensitive species and are discussed as such above. The Abert's squirrel is a ponderosa pine obligate, is not known or expected to occur in this area, and will not be discussed. The Brewer's sparrow is closely associated with sage habitats, which are not present in the immediate lease modification vicinity, and will not be discussed. As there are only intermittent streams in the analysis area there are no MIS fish with suitable habitat present and therefore will not be discussed.

Additional methodology is discussed in Section 3.11 Sensitive Species.

MIS Consistency with Forest Plan and Other Regulations

Management Indicator Species and Other Wildlife All alternatives are consistent with the Forest Plan, NFMA, ESA, RPA, Executive Order 13186, the Bald and Golden Eagle Protection Act, Forest Service Manual (FSM) and Handbook (FSH) direction. All alternatives are consistent with the recent Management Indicator Species

Amendment, Forest Plan Amendment 2005-01. This amendment was approved in May 2005. The amendment revises language in Forest Direction and Standards and guidelines for Management Areas, and the Monitoring Plan (see pages A-1 through A-17 of Management Indicator Species Forest Plan Amendment EA, Appendix A). Management direction will be further assessed at the next phase of NEPA.

3.23 Elk

Affected Environment

Elk are widespread and disperse readily across landscapes, with few habitat-related limitations. Populations are abundant (and stable or increasing) on the Forests in R2 and the GMUG. Value of habitats on Forests is increasing as habitat on adjacent private lands is lost to human development. Females are sensitive to disturbance during calving season and herds are sensitive to disturbance in the winter (USDA 2005b).

Elk use a combination of open meadows for foraging and woodlands for cover, calving and thermal regulation. The elk herds in the analysis area are migratory, using higher elevation forests and meadows during the summer. The analysis area lies in elk summer range, but not within a mapped calving area or winter range (Figure 2). The proposed activities lie within the Colorado Division of Wildlife's (CDOW) Game Management Unit (GMU) 53, which is part of elk Data Analysis Unit (DAU) E-52. The elk population estimate for this DAU, based on 2008 post-hunting surveys, was 3890 elk (CDOW 2010a), within the objective population. CDOW estimated that during the 2008 hunting season (the last for which data is currently available) for GMU 53 there were 2,379 total hunters, who harvested 478 elk, a 20% success rate. (CDOW 2010).

The primary issues affecting elk distribution are lack of habitat security due to motorized and non-motorized travel and recreation activities (USDA 2005c).

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of elk in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur..

Alternative 3 Environmental Effects

The following potential effects to elk include:

- Short-term direct effects during construction (visual or auditory disturbance or displacement of individuals from machinery, vehicles and humans)
- Long-term direct effects as a result of changes in forage and cover
- Long-term indirect effects as a result of changes in human use in the area

Declines in elk use of habitat adjacent to forest roads have been documented in many studies (Lyon 1979; Rowland et al. 2000). A study of elk in relation to logging disturbances found that there was a buffer zone of 500 to 1,000 meters (1640-3280 feet) separating areas of high elk use from areas of disturbance (Edge and Marcum 1985). Another study looked at reproductive success of elk following disturbance by humans during calving season (Phillips and Alldredge 2000). They found that elk subjected to human-induced disturbance through a 3-4 week period during calving season over two years showed lower calf survival. Generally, habitats provide more

effective security the further they are from roads. Considering documented road avoidance by elk, the minimum distance between secure habitats and an open road is ½ mile (Hillis et al. 1991).

None of the proposed activities are within mapped elk production areas. However, elk may calve at any location on and off the Forest. Therefore, if activities occur during calving season, elk may be displaced by project activities. Numerous studies have shown that elk will move back into an area once the disturbance is over and the displacement will be temporary.

The entire analysis area, and surrounding landscape, is considered as summer resident habitat.

Currently, little summer recreational use is known to occur in the area. Motorized use is limited to existing roads and trails, which are absent in the lease modification area. Access roads used would be closed to the public after construction is complete, and no increase in motorized use of the area after construction, other than minimal entries for monitoring, are anticipated. The analysis area contains no open motorized routes at this time.

Project activities may occur into the fall hunting seasons. Disturbance to both local elk populations, and to hunters whose camps are no longer accessible or desirable due to project activities and/or traffic, is anticipated. As a result, changes to elk hunting pressure in both the immediate analysis vicinity and other portions of GMU 53 are expected. Due to the small scale of the disturbance and the size of the GMU, it is not anticipated that harvest will change measurably across the GMU.

None of the analysis area is considered to be elk winter range, due primarily to elevation. Connected actions such as motorized travel on roads in the valley bottom may occur in winter range.

Because elk are very adaptable, and use a wide variety of habitats, the conversion of existing vegetation to a grass/forb, then young seral stages of disturbed habitats once roads and pads are reclaimed, is unlikely to have any measurable effects to elk at the population scale. Forage availability in this area is likely to increase once reclamation occurs, and elk may use roads for travel prior to this, especially as roads will not be open to public motorized travel. Summer range is not a limiting factor for elk in the North Fork Gunnison area (K. Madariaga, pers. comm.), and thus alteration of summer habitat is unlikely to cause noticeable population changes. Vulnerability to hunters could increase in the new road prisms and pads for several years, but abundant cover is currently found throughout the analysis area and is likely to be immediately available to elk during hunting seasons. Elk habitat in this and surrounding areas is anticipated to be much more substantially impacted by the ongoing aspen decline than by this small-scale project.

Summary and Conclusion

The negative effects from this project are of short duration and magnitude and do not result in a Forest-wide decrease in trends or deter from meeting the MIS objectives in the Forest Plan.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. HABCAP modeling was not used to determine the impacts of this habitat alteration within the cumulative effects area, as alterations at the scale anticipated would result in insignificant changes in this model. Because elk are very adaptable, and use a wide variety of habitats, the conversion of this small area of mature aspen and spruce/fir to a young aspen, spruce, or mountain shrub cover type would not have any substantial effects. Actions taken in this project are unlikely to interact substantially with other recreational, grazing, or special use actions as described in the cumulative effects table. In addition, elk populations in this and other areas on the forest are much more likely to be directly influenced through management of hunting seasons by the Division of Wildlife than from habitat changes at minor scales.

Travel management in the cumulative effects area is under analysis at this time and may result in long-term changes in open road or trail use within the analysis area, depending upon that decision. It is anticipated that overall mileage of open road and motorized trails within the analysis area will decrease once travel management is implemented. Motorized routes created for this project will not be open to the public and will be reclaimed within a short time frame.

3.24 Merriam's wild turkey

Affected Environment

Turkey are widespread and locally abundant across the Paonia district, especially in oak and other shrub habitats, but they occur in all areas below approximately 10,000 feet at times. They are tolerant of human activities, and in winter are commonly found in yards and along roadways in close proximity to humans. They nest in a variety of habitats on the district, although typically in areas with dense local cover. Brood rearing occurs frequently in areas such as openings, riparian areas, springs, burns, and aspen stands, all of which provide the invertebrates needed for food for the young birds. Populations of turkey are directly controlled by hunting seasons determined by the CDOW. Other population pressures include predation from other species such as coyotes. Habitat alteration can have both harmful and beneficial impacts to turkeys, and treatments which provide a mosaic of habitat features, allowing for all life stages

Alternative 1 Environmental Effects

The direct and indirect impacts of the "no action" alternative would not change current habitat or population conditions of turkey in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur..

Alternative 3 Environmental Effects

The following potential effects to turkey include:

- Short-term direct effects during construction (visual or auditory disturbance or displacement of individuals from machinery, vehicles and humans)
- Short-term direct mortality of eggs/nests during construction activities.
- Long-term direct effects as a result of changes in forage and cover
- Long-term indirect effects as a result of changes in human use in the area

Nesting typically begins in late April for turkeys, generally before all shrubs are leafed out. Nests usually occur within very dense local cover, and in forested stands are usually in areas with at least 60% canopy cover. If nests fail, turkeys will make multiple nesting attempts.

Individual nests could be directly lost or abandoned as a result of project activities, but turkeys may re-attempt nesting elsewhere if project actions are detrimental. Direct mortality is possible if turkeys are nesting during construction activities. Long-term effects in cover type and abundance are unlikely to cause substantial impacts to turkeys, as they utilize a wide variety of habitats in this area. Long-term changes in human use of the area are unlikely to result from this project, as described for elk above.

The project would affect 72 acres of potential summer turkey habitat, which is <.01% of the total summer turkey habitat on the GMUG NF.

Summary and Conclusion

The negative effects from this project are of short duration and magnitude and do not result in a substantial Forest-wide decrease in trends (Table 3.24), or deter from meeting the MIS objectives in the Forest Plan.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. HABCAP modeling was not used to determine the impacts of this habitat alteration within the cumulative effects area, as alterations at the scale anticipated would result in insignificant changes in this model. None of the ongoing or reasonably foreseeable future activities within this area, when combined with the proposed action, are likely to contribute to long-term cumulative impacts to this species.

Table 3.24. Turkey habitat on the GMUG NF based on habitat parameters and quality

Habitat Parameter	Habitat (acres)		Total acres
	Primary	Secondary	
Winter feeding / cover	293,157	27,912	321,069
Summer feeding / cover	490,131	1,281,664	1,771,795
Nesting	9587	101,595	111,182
Brood rearing	718,345	45,879	764,224
Roosting	43,974	200,047	244,021

3.25 Red-naped sapsucker

Affected Environment

In Colorado, red-naped sapsuckers forage in aspen, willows and cottonwoods close to their nest sites, which are almost exclusively in mature aspen stands. Typical nest stands, dominated by large aspen, have a variety of diseases that create the heart rot needed for suitable cavity excavation (Kingery 1998). Nest stands have trees infected with shelf or heartwood fungus (for drilling nest cavities) and nearby willow stands (for drilling sap wells).

According to BBS, populations appear to be stable or increasing in the United States, with areas of local declines. From the period 1966 to 2006, the 3 sapsucker species (combined in the BBS analysis) have exhibited a positive trend of +3.4%. Within Colorado, populations have exhibited similar but higher upward trends (Sauer et al. 2007). Red-naped sapsuckers have been documented during bird surveys in this area (Monarch 2009) and are seen in aspen stands throughout the district in relatively low numbers (D. Garrison pers. obs.).

Alternative 1 Environmental Effects

The direct and indirect impacts of the No Action alternative would not change current habitat or population conditions of red-naped sapsucker in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables and discussions in this analysis. The ongoing aspen decline may result in both short- and long-term loss of aspen at a landscape scale in this area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Actions with the potential for effects to this species include:

- short-term effects of disturbance during construction
- short-term potential for loss of young during construction
- long-term changes to habitat

The nest-building through fledging period runs from about May 20 through August 25 for this species (Kingery 1998). Project activities during this time may result in abandonment of nests or alteration of territorial boundaries in the analysis area. Individual nests with eggs or young could be lost during project activities if sapsuckers occur in the treatment areas. This would most likely be either from nest abandonment due to disturbance, or through direct mortality.

Habitat changes in this area would be limited to alteration of 61 acres of mature aspen stands, suitable for nesting and foraging.

Summary and Conclusion

The negative effects from this project are of short duration and magnitude and do not result in a substantial Forest-wide decrease in trends, or deter from meeting the MIS objectives in the Forest Plan.

Cumulative Effects

The cumulative effects analysis area for this species is the 47,904-acre area surrounding the proposed treatments and activities. HABCAP modeling was not used to determine the impacts of this habitat alteration within the cumulative effects area, as alterations at the scale anticipated would result in insignificant changes in this model.

None of the ongoing or reasonably foreseeable future activities within this area, when combined with the proposed action, are likely to contribute to long-term cumulative impacts to this species.

Forest-wide habitat for the red-naped sapsucker includes a total of 1,535,234 acres of potentially suitable habitat, so the amount of forest wide habitat affected would be negligible. Regeneration discussion and assumptions are the same as for goshawk noted above, as are discussions of aspen availability within the cumulative effects analysis area.

3.26 Migratory Birds

Affected Environment

The U.S. Fish and Wildlife Service (USFWS) has compiled a list of migratory bird species, which appear to be declining in numbers or distribution or for which more information is needed (FWS 2002). Table 3.26 lists the bird species of conservation concern (BOCC) in the Southern Rockies/Colorado Plateau region.

Potential nesting habitat for the BOCC is limited by the elevation, which places the area above many habitat types. According to the literature (Andrews and Righter 1992, Kingery 1998) and local data on breeding, there is breeding habitat for the golden eagle, flammulated owl, Williamson's sapsucker, and Virginia's warbler in the analysis area. Many others could be encountered as migrants or accidentals.

Table 3.26. Bird Species of Conservation Concern (BOCC)

Common name	Scientific name	Common name	Scientific name
Northern harrier	*Circus cyaneus*	Short-eared owl	*Asio flammeus*
Swainson's hawk	*Buteo swainsonii*	Black swift	*Cypseloides niger*
Ferruginous hawk	*Buteo regalis*	Lewis' woodpecker	*Melanerpes lewis*
Golden eagle	*Aquila chrysaetos*	Williamson's sapsucker	*Sphyrapicus thyroideus*
Prairie falcon	*Falco mexicanus*	Gray vireo	*Vireo vicinior*
Peregrine falcon	*Falco peregrinus*	Pinyon jay	*Gymnorhinus*

Common name	Scientific name	Common name	Scientific name
			cyanocephalus
Gunnison sage-grouse	*Centrocercus minimus*	Bendire's thrasher	*Toxostoma bendirei*
Snowy plover	*Charadrius alexandrinus*	Crissal thrasher	*Toxostoma rufum*
Mountain plover	*Charadrius montanus*	Sprague's pipit	*Anthus spragueii*
Solitary sandpiper	*Tringa solitaria*	Virginia's Warbler	*Vermivora verginiae*
Marbled godwit	*Limosa fedoa*	Black-throated gray warbler	*Dendroica nigrescens*
Wilson's phalarope	*Phalaropus tricolor*	Grace's warbler	*Dendroica graciae*
Yellow-billed cuckoo	*Coccyzus americanus*	Sage sparrow	*Amphispiza belli*
Flammulated owl	*Otus flammeolus*	Chestnut-collared longspur	*Calcarius ornatus*
Burrowing owl	*Athene cunicularia*		

Alternative 1Environmental Effects

The direct and indirect impacts of the "no action" alternative would not change current habitat or population conditions of any migratory bird species in the short term. Long-term changes would continue to be dependent on existing conditions, succession of vegetative types, and other actions within the analysis area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those for breeding birds. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Leasing in itself will have no impact on migratory birds. Post lease development may impact species protected under the Migratory Bird Treaty Act. Stipulations requiring breeding bird surveys and including timing restrictions where needed for specific species, may mitigate impacts to migratory birds. However, some bird habitat will be altered in the short term as a result of post lease development on the lease modifications, and may result in a type conversion of 72 acres, and that is likely to impact individual migratory birds, especially passerines and other birds which utilize aspen, spruce-fir, and oak for nesting.

Examples of the types of impacts which may occur are described above for certain bird species. Compared to natural processes in the area, specifically the aspen decline, the RFMP is minor in scale, and these impacts are not anticipated to result in declines in populations of any species protected by the MBTA. Disturbed areas may provide foraging opportunities for some species, and eventual revegetation of project sites, to whichever habitat type grows back, will result in suitable nesting and foraging habitat for some species.

Cumulative Effects

Natural processes and management activities in the vicinity of the analysis area will continue to impact migratory birds wherever removal or habitat conversions occur.

Consistency with Forest Plan and Other Regulations

This action is consistent with the Migratory Bird Treaty Act.

3.27 Range Resources

Affected Environment

The Dry Fork cattle allotment in the lease modification area is managed using a deferred rotational strategy. Five permittees are authorized to utilize the area with 537 cow/calf pairs from 6/15 to 10/15 annually (2834 AUMs). Grazing use alternates every year for each pasture, but generally 14-18 days in a pasture allows for growth or regrowth of vegetation. There are currently 10 grazing units created by barbed-wire or temporary electric fences and topographic features.

Range improvements within the lease modifications area are described in Figure 3.7 and Table 3.27a.

Table 3.27a. Range Improvements

Improvement Type	Name or Number	Location
Pond	803P50 Water Dog Pond	T.14S R.90W NW ¼ Sec.11
Pond	803P51 Elk Wallows Pond	T.14S R.90W SE ¼ Sec.10
Pond	803P55 Yellow Bucket Pond	T.14S R.90W NW ¼ Sec.14
Pond	803P89 Sherwood Park Pond	T.14S R.90W SE ¼ Sec.15
Pond	803P91 Rail Fence Pond	T.14S R.90W NE ¼ Sec.11
Pond	Unknown	T.14S R.90W NE ¼ Sec. 22

Alternative1 Environmental Effects

Under the no-action alternative, existing livestock grazing would continue in the area without change. Range management practices would continue to be implemented on an annual basis. Any existing range improvements would be unaffected under this alternative. Existing range and other land uses would continue in the lease modification areas. There would be no risk for surface tension cracks to form in ponds or on stock trails in the lease modification area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1 including those related to subsidence. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Modifying the existing coal leases would not have any direct effect on grazing on the Dry Fork allotment. However, post-leasing subsidence-induced ground movements have the potential to damage the stock ponds, fences or stocks trails if surface tension cracks form where these features are present. In the dry uplands in the area, stock ponds create important water sources for stock and wildlife. Loss of any water source would have negative impacts on the animal distribution and range health. If a crack were to form in an earthen stock pond, the pond may cease to hold water or cease functioning effectively. The probability for cracks to form under stock ponds in the area is negligible. Therefore, the risk to damaging stock ponds is low.

Subsidence of the land surface is not likely to damage fences. During subsidence, the land surface lowers gently, and without noticeable changes to the surface topography, therefore it is unlikely that fences would be damaged. Dispersed surface tension cracks may form across stock trails in the area. Cracks could pose a safety hazard to cattle if they formed and were present when cattle were on the allotment. The likelihood that cracks would form is considered low. Further, stipulations from the parent lease that would apply to the lease modification areas would require repair if any of the range improvements were damaged. No other lease stipulations are determined necessary. However, potential future development (i.e. surface uses) associated with the RFMP (Section 3.2) could affect range resources from the standpoint of road and drill pad construction interrupting grazing rotations, damaging fences, reduce forage. Recommendations for future project-specific BMPS for range are in the project record. Table 3.27b summarizes those potential impacts:

Table 3.27b. Summary of range impacts from post-lease development

Range Impact	Summary of Impact
Forage loss	Until fully reclaimed, the construction of access roads and drill pads will result in a long-term loss of forage on about 72 acres.
Stock ponds	There are a number of stock ponds located in the proposed lease area (Table 3.27a, Figure 3.7). These ponds are critical for managing the grazing on the allotment.
	Subsidence and the loss of spring flows and water holding capacity to ponds and spring developments are additional potential impacts to stock ponds
Fences	Future development of the additional coal leases will likely cross the pasture division fence, 803F58, Deer Creek-Sherwood Pasture Division Fence.
Maintenance of cattle guards	Future development related traffic may cause additional filling in of cattle guards.
Grazing management	Future development has the potential to impact grazing management. Traffic associated with drilling activities is the primary cause. The District has experienced constant difficulties with gates being left open. When gates are left open this often results in livestock drifting into the wrong pasture/allotment. When livestock move into the wrong area this results in the loss of control of the livestock, resulting in livestock over-grazing certain areas or grazing areas they are not supposed to graze resulting in unsatisfactory conditions.
Roads causing cattle drift onto private land	One additional potential impact is the effect of additional roads increasing cattle drift onto adjacent private land and on the West Elk allotment. Currently, the private land to the west of the Sherwood pasture, and Coal leases COC 001362 and COC 067232 are poorly fenced. The private land fences are in disrepair. The permittees have attempted to minimize cattle drift onto these private lands, and further south onto the West Elk allotment.
Noxious weed infestations	Ground-disturbing activities usually create opportunities for infestations of noxious weeds. There are known populations of Canada thistle, musk thistle, houndstongue and hoary cress (white top) near the project site. The seeds from these weeds can be air-born, vehicle-born or transported by wildlife and livestock. Any area where the existing vegetation is removed and bare soil is left exposed creates a potential site for noxious weed infestations.

Range Impact	Summary of Impact
Toxic Substances	Poisoning of livestock and wildlife by toxic substances –
Impacts on livestock distribution	Construction and exploration activities often have negative effects on livestock. The sounds and commotion of the activities often frighten livestock within an area where they can see and/or hear the activities. This results in livestock not using an area larger than the area of actual disturbance.

With stipulations and future surface-use specific requirements, the implementation of this alternative would not substantially affect the long-term grazing use on NFS or adjacent private lands. Surface disturbances on the coal lease tract and the exploration area would be minimal and temporary, with reclamation returning disturbed areas to a stabilized and productive condition. Evaluations of other reclamation work in the area indicate that revegetation can be successfully accomplished. Surface disturbances on the coal lease tract and the exploration area would be minimal and temporary, with reclamation returning disturbed areas to a stabilized and productive condition. Evaluations of other reclamation work in the area indicate that revegetation can be successfully accomplished. Once revegetation has occurred, the areas of previous disturbance (usually oak brush or shrub areas in the case of the West Elk Mine) become grassland areas that are a benefit to wildlife and livestock.

Depending on timing, new revegetation efforts can be negatively affected by livestock presence and use. Typically, in order to assure revegatative success, temporary electric fencing is placed around newly reclaimed areas during the first growing season. After this period, fencing is removed and livestock usage does not appear to impact revegetation efforts as long as the livestock is managed according to standards.

Cumulative Effects

Cumulative effects would include the potential for multiple disruptions of stock watering sources if ponds are damaged by subsidence; however, cumulative impacts due to subsidence are anticipated to be negligible in the area. There could be cumulative impacts related to potential additional post-lease surface use (72 acres). These activities will adversely affect the range management plan for the area by increasing the traffic and seasonal use in the area. This will add to the already growing problem with cattle migration off of scheduled allotments. As reclamation activities take place, cattle grazing in these areas can slow the efforts in a given year, but does not lead to lack of reclamation success.

Mining and grazing would remain the dominant land uses in the immediate area of the coal lease modification. Vegetation treatments for wildlife purposes will also enhance range conditions.

Consistency with Forest Plan and Other Laws

All alternatives are consistent with Forest Plan regarding Range and other resources and Forest Service Manual 2200-Range Management.

3.28 Recreation

Affected Environment

There is limited dispersed recreational use on the lease modification area due to the distance from existing public roads and grown-over trails. There are no developed recreational facilities operated by the Forest Service in the modification areas. Most dispersed recreational use occurs during hunting seasons. There is also a limited amount of snowmobiling that occurs in the area due to the oakbrush and aspen vegetation types making travel difficult. The Recreational Opportunity Spectrum (ROS) setting for the area ranges from semi-primitive non-motorized to roaded natural. There is one National Forest System non-motorized trail in the lease modification area (Sunset Trail, #870). There are no recreation special use or outfitter guide permits in the area. Off-trail travel is permitted by horses and hikers who may use the routes authorized to range permittees for motorized travel.

Alternative 1 Environmental Effects

Under the No Action alternative, current recreation uses and activities would continue. There would be no impact on recreation uses (motorized and non-motorized recreation, or hunting) from this alternative. Existing uses would continue in the lease modification areas. There would be no risk for surface tension cracks on recreation trails in the lease modification area.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

Subsidence-induced ground movements would not affect recreation opportunities in the lease modification areas. Surface tension cracks may form on existing trails, but would be expected to close unaided. There would be no change to the ROS setting opportunities.

There would be no impacts on recreation uses (motorized and non-motorized recreation, hunting) from either leasing the coal or from subsidence. Recreational uses could be impacted if post-lease surface use occurs. NFSR 710 near Beaver Reservoir may need to be upgraded if drilling equipment for MDWs were to need it to access the area either for coal reserves on forest or on private lands. This could encourage additional users to access the area on the improved road. In addition, presence of drill rigs and heavy equipment on the roads, and operating in the area could reduce a person's recreational experience. As these activities would likely occur during summer and into the fall months, they would be occurring in the time recreationists would most likely use the area. In terms of hunting, surface use could cause game to move out of the area, and reduce the hunting opportunity.

Cumulative Effects

RFMP (Section 3.2) may temporarily increase routes available for hiker/horse recreational use. Post-lease development may improve existing roads making the area more accessible for recreational uses. In addition, there could be disruptions to the recreational experience over a longer period of time, if post-lease surface activities occur. Additional drilling and road use would continue during summer and fall for 2-6 more years. Cumulative effects to recreation use would include the potential for surface tension cracks to form on a trail that passes both through the lease modification areas and areas previously approved for leasing and mining. It is anticipated that surface tension cracks, if they form, would be dispersed and not concentrated. The cumulative effect would be minimal.

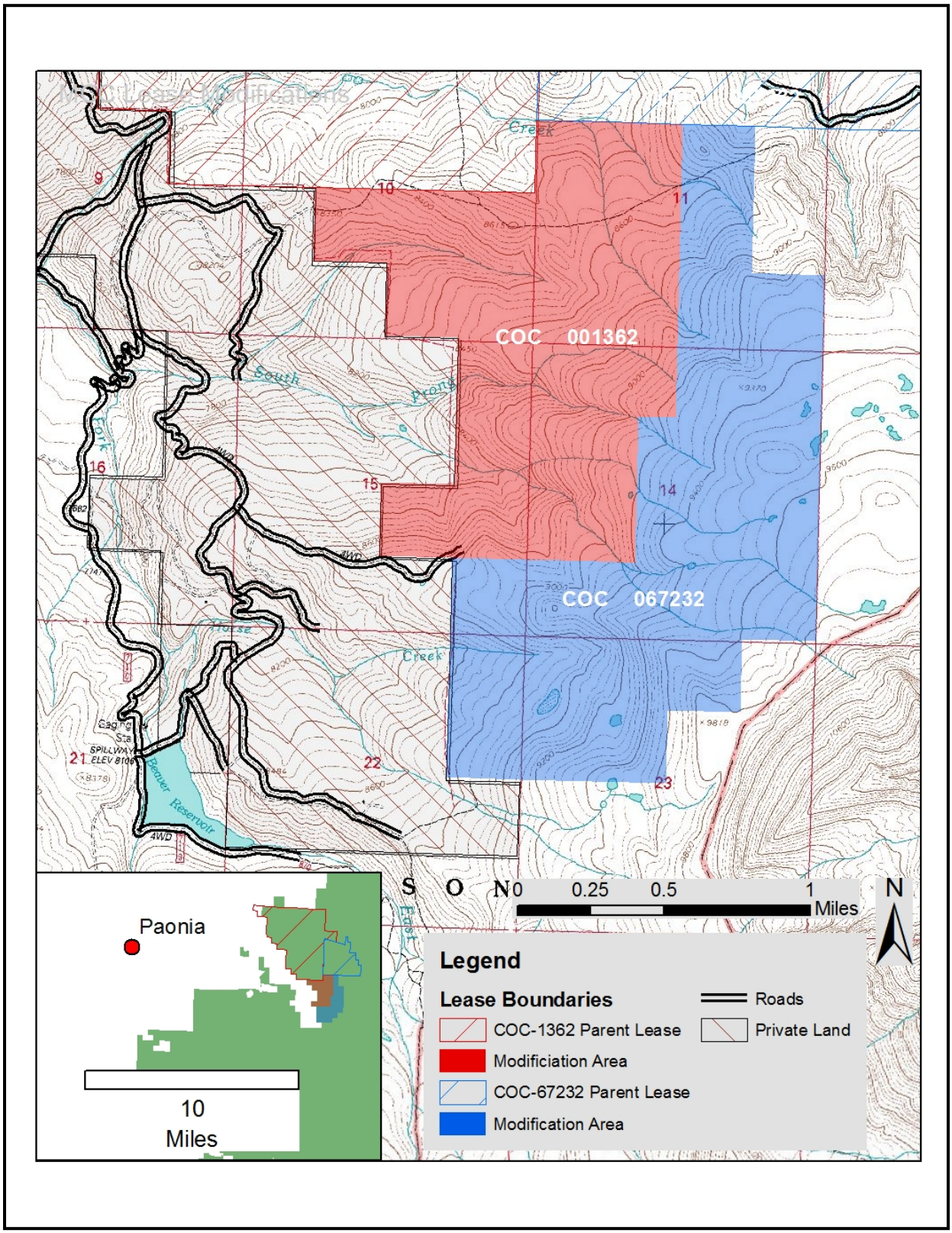
Consistency with Forest Plan and Other Laws

All alternatives are consistent with Forest Plan direction for recreational use and management under the ROS.

3.29 Transportation System

The project and cumulative effects area of influence is State Highway 133 between Paonia and Somerset, CO to the West Elk Mine; and County Road (CR) 710/ NFSR 710 (Minnesota Creek) east from the Town of Paonia and possibly NFSR 711 (Dry Fork Minnesota Creek) if post lease modification development were connected to existing leases. Numerous roads exist on nearby private lands (Figure 3.29a). Aerial photography indicates that there may be remnants of motorized roads or trails in the lease modifications area. There is one non-motorized system trail (#780 Sunset Trail) in the lease modifications area which is discussed in Section 3.28. See Figure 3.29 for the system (public) roads in the vicinity of the lease modifications.

Figure 3.29. Road system in vicinity of lease modifications.



The major transportation route in the Paonia and Somerset region is State Highway 133. This highway serves local vehicular and truck traffic for the communities in Delta and Gunnison Counties. The highway provides access to the coal handling facilities and existing spur rail line in the Somerset area, and to surface operations at the West Elk Mine and other mines in the North Fork Valley. State Highway 133 is an asphalt, all-weather, two

lane highway which has been periodically upgraded over the past 20 years. In 1996, the average daily traffic on Highway 133 east of Paonia was 3,150 vehicle trips per day. Traffic counts in the Somerset area average 2,000 per day and decrease to only 1,050 per day between the Somerset area and the town of Marble. Based on a one % per year population growth rate, it is estimated that the 2004 average daily traffic on Highway 133 east of Paonia was approximately 3,400 vehicle trips per day. Traffic counts in the Somerset area average 2,160.

CR 710, also called the Minnesota Creek Road, is an all-weather county road with an asphalt surface for the first mile east of Paonia, then becomes a gravel surface. CR 710 also provides access for local residents, stock hauling and recreationists accessing the National Forest. Winter maintenance ends on CR 710 about 1 mile west of the Forest boundary, at the intersection with NFSR 711. CR 710 has been part of the access for MCC's surface facilities since 2001. Primary use has occurred during summer and fall months (generally June through October), although winter use of CR 710 for mining-related drilling and support traffic occurred in 2000 and 2001. Delta County performed road upgrades in 2003 that included resurfacing, curve widening and turnout construction. Traffic count data collected by Delta County at "end of pavement" on CR 710 in August 2002 showed 83 passes (about 41 round trips). This count was taken during the active MCC drilling season in 2002. Delta County also reports the results from a 1999 engineering study that estimated traffic counts based on the number of residences a road serves. The basic assumption was for 10 trips per day for every residence (5 round trips). Using this method, the traffic on the Minnesota Creek road ranged from about 150 round trips close to Paonia Town limits, 75 round trips past the last road intersection, and 10 round trips at the end of the road. At this time, traffic counts can double in the summer months due to drilling related traffic. Traffic can also increase during the general hunting seasons.

The GMUG manages NFSR 711 as a low standard road, suitable for high clearance vehicles. The road is native surface with spot gravelling. Recently, about 4.5 miles have been upgraded with blading, gravelling, curve widening and turnout construction. MCC completed these upgrades under a Forest Service Road Use Permit for methane drainage. In the past, Like CR 710, NFSR 711 is a primary access route for MCC's methane drainage drilling. Traffic use on NFSR 711 is low. A small amount of traffic uses the road for recreational purposes, including ATVs, dirt bikes and occasional mountain bikes. Grazing permittees also use the road for access to range allotments, and hunters use the road to access hunting areas. Within the parent lease area, NFSR 711 is native surface, and has had some recent upgrades up to the location where the road crosses Deep Creek. The Forest Service and MCC installed a low water crossing on NFSR 711 at Deep Creek in 2003. East of that crossing, NFSR 711 becomes more primitive, passable only by high clearance vehicles. Snowmobiles use the NFSR 711 as a travel route. This road may be needed for future use associated with the lease modifications, although that is uncertain at this time.

Primary access to existing MCC surface facilities is via the MCC's private access Sylvester Gulch Road from MCC's mine facilities.

Alternative 1 Environmental Effects

Under the No Action Alternative, mining of the reserves at the West Elk Mine would continue at existing rates until the coal reserves are depleted. No additional impacts on the transportation system would be expected. On-going effects related to methane drainage drilling would continue to occur on CR 710/NFSR 710 and NFSR 711 until project completion. Other uses of the existing roads would continue to occur. Additional approved temporary roads related to post-lease mining related to operations on the parent leases are yet to be constructed.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

Alternative 3 Environmental Effects

The existing use of State Highway 133 as access to the mine operations and facilities would continue at close to the existing rate for an additional 1.6 years. No additional demand for transportation of employees to MCC's mine

surface operations facilities, or coal handling and transport facilities would be required under this alternative. Mining operations and processing would be extended throughout the period required to mine available coal.

Subsidence-related surface tension cracks are not anticipated to form on roads that are in the lease modifications (NFSR 711/710). Trails effects are described in Section 3.28.

Some level of traffic (even though the primary access is the gated Sylvester Gulch Road) on CR 710/NFSR 710 and NFSR 711 would continue until completion of the currently approved methane drainage activities. If post-leasing surface use on the lease modifications is proposed (Section 3.2,), CR 710/NFSR 710 and NFSR 711 may be used to access the modification area for additional MDW facilities and associated gated access roads. There will likely be a small amount of traffic associated with installing water monitoring devices and subsidence monitoring devices, along with trips to take measurements at these locations.

Section 3.2 notes that up to 48 MDWs (48 acres disturbance) may be needed over the life of the lease modifications, which in turn would require 6 miles of temporary access roads (24 acres disturbance) to be built. This surface disturbance would be temporary, as drill pads and temporary roads would be reclaimed by recontouring the land surface, obliterating the road prism, and revegetating the disturbed area. These temporary access routes would not be open to the public. Traffic levels on CR 710 and NFSR 711 would likely not experience any change from current levels and NFSR 710 (especially near Beaver Reservoir) may experience increased traffic and or need upgrades for over-sized vehicles such as drill rigs for MDWs for safe travel by MCC or the public.

Cumulative Effects

Cumulative effects in the form of wear and tear, traffic, and safety issues would continue on the existing transportation system from vegetation management activities for wildlife habitat improvements, range management, recreational users, private residences and coal mining.

MCC has several miles of approved constructed and planned temporary roads just north of the lease modifications. Approved MDWs and temporary access roads will be reclaimed after use. Access for drill rigs and supplies would continue to use the CR 710/NFSR 710 and NFSR 711routes, and will continue to maintain higher traffic levels for the next several years. MCC would be responsible for any road damage and repairs needed. Roads and trails would continue to be managed under Forest Service travel management direction.

Subsidence-related surface tension cracks are anticipated to form on road and/or trails that are in the parent lease areas on near NFSR 711 and possibly on routes crossing private (Figure 3.2). Depending on location above the mine workings, cracks ranging from a few inches to a foot wide may form on a road or trail. It is anticipated that surface tension cracks, if they form, would be dispersed and not concentrated, therefore, they would not affect the overall quality or usability of the trail. Some cracks may naturally attenuate, and other may need to be repaired in order to maintain a safe travelway.

Consistency with Forest Plan and Other Laws

This activity is consistent with the GMUG Forest Plan, the Gunnison National Forest Travel Management Plan (2010), and Forest Service Handbook (FSH) 7700.

3.30 Roadless

Background

In January 2001, the Roadless Area Conservation Rule (2001 Rule) was adopted into regulations at Title 36 of the Code of Federal Regulations Part 294 (36 CFR 294), Subpart B (66 FR 3244). The 2001 Roadless Rule identified approximately 4.43 million acres, or about 31 percent, of the National Forest System (NFS) lands in Colorado, as “inventoried roadless areas” (IRAs), based on existing inventories of roadless areas. IRAs contained generally undeveloped areas that were typically 5,000 acres or greater in size.

Since its promulgation, the 2001 Roadless Rule has been through extensive litigation. In response to a court ruling, the State Petitions Rule was promulgated in May 2005; wherein governors had until November 13, 2006 to petition the Secretary of Agriculture to propose state-specific direction for managing roadless areas within their state. Ongoing uncertainty about the future of the 2001 Roadless Rule was a key factor that influenced Colorado to initiate a state-specific petition to manage roadless areas in Colorado.

Currently, the 2001 Roadless Rule is in effect nationwide, except in Idaho, which has its own state-specific roadless rule. However, the Final Draft Environmental Impact Statement for the Colorado Roadless Rule was posted to the Federal Register on May 4, 2012. Therefore, it is reasonable to expect the Colorado Roadless Rule will be in effect before the completion of this environmental analysis. This section will consider environmental effects of alternatives consistent with the 2001 Rule and the proposed Colorado Roadless Rule, as well as the no action alternative.

Roadless Inventory

The majority of both lease modifications is located in the West Elk IRA. This area was inventoried in 1979 as part of Roadless Area Review and Evaluation (RARE II) and is on file in the USFS Washington Office. The West Elk IRA is approximately 94,600 acres.

The GMUG Forest Plan describes much of the West Elk Roadless Area as having compromised character due to management activities including roads, ditches, reservoirs, etc. The inventory evaluation process for the Colorado Roadless Rule reaffirmed these impacts to roadless characteristics. In particular, approximately 51 miles of road construction, past vegetation treatments, and other management activities indicated a need to reconsider the boundaries and composition of this IRA. As part of this process, additional areas outside of the West Elk IRA, meeting the criteria for roadless, were also identified for inclusion in the Colorado Roadless Rule inventory.

This resulted in the identification of seven individual Colorado Roadless Areas (CRAs) that more accurately aligned with the current conditions on the ground. The seven CRAs that overlap with the West Elk IRA include 1) Beckwiths CRA (18,400 acres); 2) Soap Creek CRA (8,100 acres); 3) Curecanti CRA (12,400 acres); 4) Mendicant CRA (19,100 acres); 5) Mt. Lamborn CRA (22,600 acres); 6) Sunset CRA (5,800 acres); and Flatirons CRA (11,500 acres). These seven CRAs total 97,800 acres.

The surface activities associated with the proposed action would take place in the Sunset CRA. Therefore, the six other CRAs are generally not analyzed in more detail in this section. Approximately 1450 of the 1722 cumulative acres of the lease modifications are within the West Elk IRA/Sunset Roadless Area.

Regulatory Framework

2001 Roadless Area Conservation Rule

The 2001 Rule prohibits road construction, road reconstruction, and tree-cutting within IRAs. Although some exceptions to these prohibitions exist, there are no exceptions in the 2001 Rule that would allow road construction associated with the lease modifications being analyzed for this decision. Tree-cutting incidental to the management activity is allowed under the 2001 Rule.

Colorado Roadless Rule

The Colorado Roadless Rule is a state-specific rule to provide management direction to approximately 4.2 million acres of CRAs on NFS lands in Colorado. Road construction, road reconstruction, tree-cutting, and the use of linear construction zones are prohibited in CRAs, with some exceptions. This Rule was developed in collaboration with the State of Colorado and addresses state-specific situations and concerns in Colorado's roadless areas. These include: (1) reducing the risk of wildfire to at-risk communities and municipal water supply systems; (2) facilitating exploration and development of coal resources in the North Fork coal mining area; (3) permitting the construction and maintenance of water conveyance structures; (4) permitting access to current and future electrical power lines and telecommunication lines; (5) accommodating existing permitted, or allocated ski areas; and (6) restricting linear construction zones.

The Colorado Rule accommodates the continued operation of coal mines within an area defined as the North Fork coal mining area, which includes the Sunset CRA and portions of the West Elk IRA. This area is about 19,100 acres which allows for the construction of temporary roads for exploration and surface activities related to coal mining for existing and future coal leases. Tree-cutting incidental to the management activity not otherwise prohibited is allowed under the Colorado Rule. The Colorado Rule is expected to be finalized early summer of 2012, prior to completion of this analysis and final decision of this proposal.

Affected Environment

Roadless Area

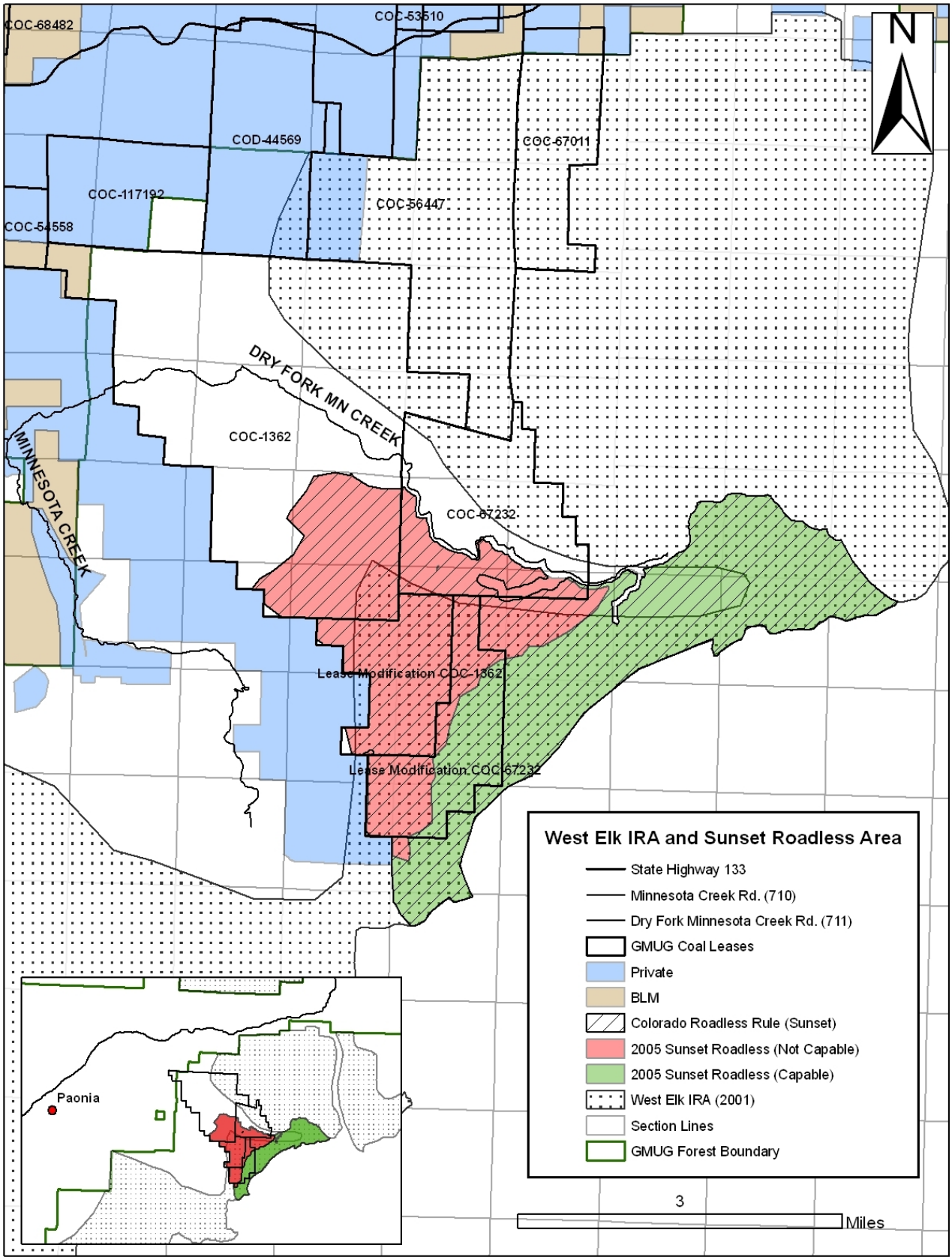
Coal exploration and underground mining activity have occurred in the West Elk IRA over the past 40 years. From 1979-2008, about 30 miles of road have been constructed in association with coal exploration and methane drainage activities within the Coal Creek Mesa portion of the West Elk IRA. Approximately another 16 miles were authorized for construction in 2008 and 4.8 miles authorized for upgrading (E Seam EIS). About a third of these road miles (generally those constructed prior to 1995) were closed to full-sized vehicle traffic following completion of coal activities, although some remain and are used as ATV trails. The other half of those road miles are associated with previous methane drainage projects, and have either been decommissioned by obliteration, been approved as life of mine roads, or will be decommissioned to ATV trails per earlier decisions associated with the Panel 16-24 Methane Drainage Project DN/FONSI and Sylvester Gulch Road/Long Draw Saddle Extension Upgrade DN/FONSI (USDA FS 2002a and USDA FS 2006a).As part of a coal exploration project in 1996, 4.9 miles of temporary road were approved and constructed. Of this total, 4.4 miles of road were subsequently reclaimed, barricaded, and posted as closed by administrative order. Approximately 0.5 miles of road to exploration drill-sites 96-22-1A and 96-22-1B were reconstructed. This road is located on land that has since been exchanged for other public lands and is now in private ownership. An additional 3.6 miles of road associated with past drilling sites was closed for a total of 8 miles of road closed in 1996. In 1998, 3.4 miles of temporary road and 18 exploration drill sites were proposed by MCC and approved by the USFS. None of these sites or roads was constructed.

In the spring of 2001, MCC began a methane drainage program for operations in the B Seam to the north and east of the Deer Creek Shaft/E Seam project area. Through several analyses prepared between 2001 and 2005, about 17 miles of road construction was approved in the Coal Creek Mesa portion of the West Elk IRA (Figure 12). The analyses forecasted that these road mileages would affect the IRA through about 2007 or 2008. By mid-2006, all of this mileage had been constructed, and about eight miles of these roads had been decommissioned by obliteration, and about one mile had been decommissioned to an ATV trail (that portion being in Deep Creek which was approved to remain as ATV access for MCC monitoring of a ground water well in 2004). The DN/FONSI for the Sylvester Gulch Road Construction and Long Draw Saddle Extension Upgrade extended the term of use for about five of the 18 miles through the life of the mine (about 2030). The remainder of the mileage will be decommissioned by obliteration, or decommissioned to an ATV trail per the previous decisions. Prior to the previously described activities, a number of roads had been established and existed in the Coal Creek Mesa portion of the West Elk IRA when it was inventoried for its roadless character (RARE II 1979).

The Sunset CRA is approximately 5,800 acres and is located nine miles east of Paonia, CO in Gunnison County. It is managed by the Paonia Ranger District, GMUG National Forests. The area is north and contiguous to the West Elk Wilderness Area and is bounded by private land in-holdings to the west and roads to the north. It is separated from the Flatirons CRA by NFSR 711 (Dry Fork of Minnesota Creek Rd). This CRA is within the Northern-Central Highlands and Rocky Mountain Eco-Section (M33IH) with elevations ranging from 6,300' to 12,000'. Existing vegetation is dominated by aspen mixed with spruce/fir. Gambel oak occurs in the lower elevations. This area provides summer range for elk, mule deer, black bear, and mountain lion. Lynx habitat has been mapped in this CRA. This CRA is adjacent to the West Elk Wilderness Area, a mandatory Class 1 airshed designated by Congress and listed in the Clean Air Act. The lands directly adjacent to the Wilderness boundary offer a high degree of naturalness. The Deep Creek Slide area exhibits a striking geologic feature. Opportunities for remoteness and solitude are present in the vicinity of the wilderness boundary. The terrain is rugged. However, the proximity to trails and roads may somewhat diminish opportunities of self-reliance and adventure. The area is heavily used during hunting season.

The Sunset CRA overlaps with the North Fork Valley Coal area. Existing methane drainage projects are occurring on some areas of the Flatirons CRA and Sunset CRA. In addition to coal interests, the area is identified as having high potential for oil and gas.

Figure 3.30a. West Elk IRA and Sunset Roadless Areas



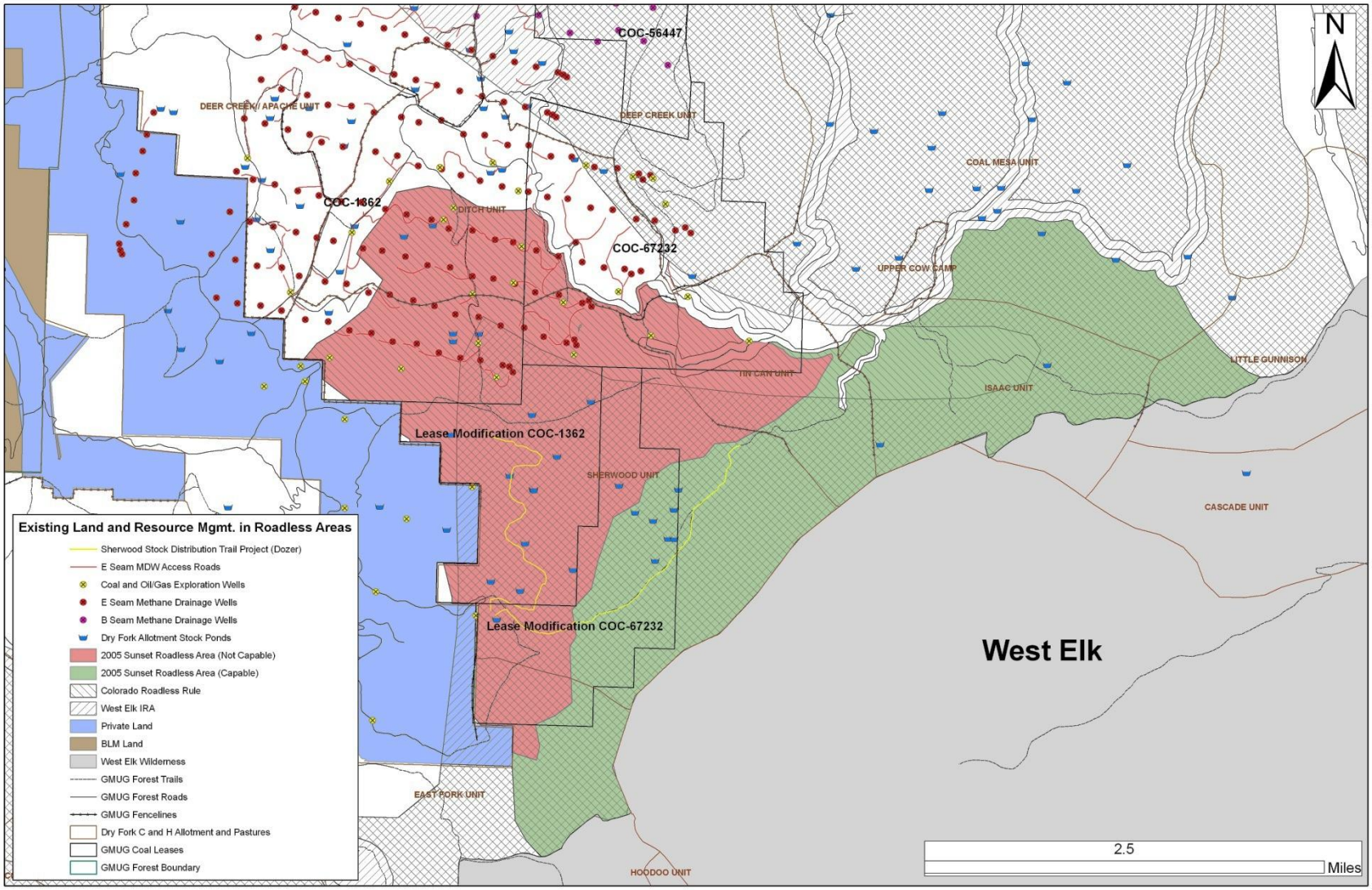
Roadless Characteristics

The nine roadless area characteristics listed below that were identified in the 2001 Roadless Rule preamble and are unchanged in the proposed Colorado Roadless Rule (FEIS 4). These characteristics found in the 2001 Roadless Rule are reiterated by the Colorado Roadless Rule to, "provide lasting protection for IRAs within the context of multiple-use management." The purpose of the Colorado Roadless Rule is to provide protections for the nine characteristic roadless area qualities. These same nine qualities for the roadless areas in and around the lease modifications are described below:

- *High quality or undisturbed soil, water and air.* Soils in the area are similar to that in adjacent lands. Typical ongoing soil disturbances range from grazing livestock, to natural unstable slopes and slumping. Within the lease modification area, previous disturbances have included range improvements such as dozer lines for fencing, stock pond creation, stock distribution trails, as well as coal exploration (circa 1960s and 70s). Portions of the West Elk IRA have also been disturbed from prescribed burning as well as mechanical vegetative treatments. Soils in the area are highly productive, and previous disturbances in the West Elk IRA due to mining re-vegetate quickly. With respect to water, within the West Elk IRA there are diversions and structures for irrigation as well as improvements for livestock grazing (stock ponds). Within the proposed Sunset CRA, other than range improvements for livestock grazing, all the springs and seeps are in their natural state. The area is currently in compliance with air quality standards.
- *Sources of public drinking water.* There are no sources of public drinking water in Sunset Roadless area. However there is a municipal water supply (Town of Paonia) in other areas of the West Elk IRA.
- *Diversity or plant and animal communities.* Diversity of plants and animals within the West Elk IRA and proposed Sunset CRA are similar to that found elsewhere in the mountains shrub, aspen, and spruce fir habitats in the North Fork Valley. There are no identified unique vegetative assemblages or critical habitat identified in this area.
- *Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land.* Biological Assessments for projects within the West Elk IRA and proposed Sunset CRA consistently find that there is only one federally listed terrestrial species that has the potential to be found in the area, the Canada lynx. Furthermore, it has been found that these species do not occur in the project area and only a minor amount of potential lynx habitat has been disturbed. Certain mammal and raptor species (i.e.. American martin and goshawks) have been known to utilize areas within in the West Elk IRA and proposed Sunset CRA.
- *Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.* Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation are permitted; however, recreation is primarily dispersed non-motorized use in the project area (generally hunters access the area on mine roads) and winter motorized (snowmobiling). See Recreation Section. Use of this area has allowed motorized recreation and will continue to offer semi-primitive motorized dispersed recreation; however, it is not a destination for primitive or semi-primitive non-motorized recreation. Recreation uses are consistent with Roadless designation.There is limited dispersed recreational use within the area due to the distance from existing public roads and grown-over trails. There are no developed recreational facilities operated by the Forest Service in West Elk IRA or proposed Sunset CRA. Most dispersed recreational use occurs during hunting seasons. There is also a limited amount of snowmobiling that occurs in the area due to the oakbrush and aspen vegetation types making travel difficult. The Recreational Opportunity Spectrum (ROS) setting for the area ranges from semi-primitive non-motorized to roaded natural. There is one Forest non-motorized trail in the lease modification area (Sunset Trail, #870), however the majority of this route is overgrown and there is no currently defined trail on the western half. There are no recreation special use or outfitter guide permits in the area.
- *Reference landscapes.* No reference landscapes occur within the West Elk IRA and proposed Sunset CRA.
- *Natural-appearing landscapes with high scenic quality.* Typically within the middle and eastern portion of the West Elk IRA, the foreground, middle ground, and background distance zones have disturbances to scenic resources that are readily noticeable. These areas are readily accessible due to the presence of roads and are used for high-impact activities, such as OHV recreation. The lease modification areas have Scenic Integrity Objectives of "moderate" and "moderate/high". The proposed Sunset CRA is not directly visible from a public highway or NFSRs which are secondary travelways and low use areas. Both the IRA and CRA are visible from vistas within the nearby Wilderness.

- *Traditional cultural properties and sacred sites.* No traditional cultural properties or sacred sites have been located within the West Elk IRA and proposed Sunset CRA.
- *Other locally identified unique characteristics.* None have been identified.

Figure 3.30b. Existing and Approved developments in and near the Sunset Roadless Area



Existing Land & Resource Management in Roadless Areas

Livestock improvements - The Dry Fork C and H (Cattle and Horse) Allotment was established in 1905; however, certain pastures within the allotment are rested. The Dry Fork Allotment was split off from the Minnesota Creek Allotment in 1934 by the building of a drift fence on the drainage divide between Minnesota Creek and Horse Creek which is in the Sunset Roadless Area and the proposed lease modification area. A Range Management Plan from 1940 described the allotment as 31,360 acres in total with a net usable acreage of 24,700 acres. The Sunset area is steep and rugged with thick mountain shrub vegetation covering much of the landscape making management of the area difficult. Over the decades, many projects have been carried out on the allotment to facilitate stock movement and grazing distribution (for example, heavy equipment has been used to clear fence lines and stock trails, as well as to build stockponds) and to enhance the forage production on the unit (mechanical, fire and herbicidal treatment).

Coal and Oil/Gas Exploration - Numerous temporary roads associated with coal and oil/gas exploration have been pushed into the Sunset Roadless Area since the 1940s. Atlantic Richfield (ARCO) drilled at least 13 coal and oil/gas exploration wells in the Sunset Roadless area beginning in the 1960s. One of the roads built to develop the MG-17 well continues into Sunset Roadless Area. See Figure 3.30b below.

Figure 3.30c. Portion of road in southwest corner of Section 14 constructed as part of the Sherwood Trails project (D. Gray, 2011).

Environmental Effects

The Affected Environment section above identified nine roadless characteristics as defined in the 2001 Rule and the Colorado Roadless Rule. Four of these are present and will be further analyzed in the context of each alternative. These four are: 1) High quality or undisturbed soil, water, and air; 2) Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land; 3) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation; and 4) Naturally appearing landscapes with high scenic quality. The other five characteristics either do not exist, or are not expected to change among alternatives.

Alternative 1

Under the No Action alternative, the lease modifications would not be approved, and no mining would occur in these specific areas. Impacts to roadless character and values from mining coal under these areas would not occur on these lands. However, these lands have existing impacts to roadless character associated with other management activities.

- *High quality or undisturbed soil, water and air.* Alternative 1 would have no impacts to high quality, or undisturbed soil, water, and air. The No Action alternative would not result in additional surface activities that would negatively impact soil, water, and air.
- *Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land.* Alternative 1 would have no impacts to habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land.
- *Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.* Alternative 1 would have no impacts to primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.
- *Natural-appearing landscapes with high scenic quality.* Alternative 1 would have no impacts to natural appearing landscapes with high scenic quality.

Summary

Alternative 1 would have no impacts to roadless areas or roadless characteristics.

Alternative 2

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with the stipulations and the lease notice outlined in Table 2.1a outlined in Section 2.1. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur as outlined below:

- *High quality or undisturbed soil, water and air. Soil, water, and air resources could be less impacted under Alternative 2 than Alternative 3*. Impacts would likely be minimized and temporary due to strict reclamation standards in stipulations and consistency with the 2001 Roadless Rule. Impacts to soil, water, and air are discussed in more detail in Table 2.3 Comparison of Alternatives.
- *Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land.* Habitat for Canada lynx could be less impacted under Alternative 2 than Alternative 3. Up to 48 acres of suitable Canada lynx habitat could be lost through impacts of the roads and well pads. Impacts could be temporary for the life of the project and over the long-term these impacts could be mitigated through the restoration of the well pads.
- *Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.* These classes of recreation could be less impacted under Alternative 2 than Alternative 3. Impacts could likely be temporary and vary based on proximity to methane vents and associated disturbance. Primitive and semi-primitive recreational experiences could be adversely affected by a decrease in opportunities for solitude due to the increased sights and sounds of industrial activities during the life of the project. After the life of the project, the primitive and semi-primitive recreational opportunities could return to baseline conditions.
- *Natural-appearing landscapes with high scenic quality.* Natural-appearing landscapes with high scenic quality could be less impacted under Alternative 2 than Alternative 3 in the short-term (life of the project). Impacts could be temporary and somewhat mitigated by lease stipulations and consistency with provisions in the 2001 Roadless Rule. As discussed in Table 2.3, development is not likely to be seen from public travelways and topographic and vegetative screening could be used to prevent visual intrusion. In the long-term, the natural appearance of the area could return back to baseline conditions due to reclamation of surface disturbance areas. Disturbance from pads would be temporary and in this environment, reclamation is very successful which returns the area to an unroaded condition within a few years.

Summary

The roadless characteristics within the Sunset CRA could be adversely impacted over the short-term from construction activities associated with the well pads. Impacts would generally be short term (life of the project) and could return to baseline conditions after well pads are rehabilitated.

Alternative 3

Under Alternative 3, the Forest Service would consent to leasing and the BLM would modify the leases with stipulations and a lease notice in the context of the Colorado Roadless Rule. Under this rule, road construction would be allowed to support coal-related activities within the Sunset CRA. These activities, such as methane venting, could occur with road construction. Roads and well pads would be rehabilitated after they were no longer needed. The impacts to roadless character are discussed below and assume that methane vents are constructed with roads.

- *High quality or undisturbed soil, water and air.* Soil, water, and air resources would be more impacted under Alternative 3 than Alternatives 1 and 2. Impacts would likely be minimized and temporary due to strict reclamation standards in stipulations and consistency with the Colorado Roadless Rule. Impacts to soil, water, and air are discussed in more detail in Table 2.3 Comparison of Alternatives.
- *Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land.* Habitat for Canada lynx would be more impacted under Alternative 3 than Alternatives 1 and 2. Up to 72 acres of suitable Canada lynx habitat would be lost through impacts of the roads and well pads. Impacts would be temporary for the life of the project and over the long-term these impacts would be mitigated through the restoration of the roads and well pads.
- *Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.* These classes of recreation would be more impacted under Alternative 3 than Alternatives 1 and 2. Impacts would likely be temporary and vary based on proximity to methane vents and associated disturbance. Primitive and semi-primitive recreational experiences would be adversely affected by a decrease in opportunities for solitude due to the increased sights and sounds of industrial activities during the life of the project. After the life of the project, the primitive and semi-primitive recreational opportunities would return to baseline conditions.
- *Natural-appearing landscapes with high scenic quality.* Natural-appearing landscapes with high scenic quality would be more impacted under Alternative 3 than Alternatives 1 and 2 in the short-term (life of the project). Impacts would be temporary and somewhat mitigated by lease stipulations and consistency with provisions in the Colorado Roadless Rule. As discussed in table 2.3, development is not likely to be seen from public travelways and topographic and vegetative screening will be used to prevent visual intrusion. In the long-term, the natural appearance of the area would return back to baseline conditions due to reclamation of surface disturbance areas. RFMP activities under this alternative are expected to be similar to those activities shown in Figures 3.30d-g. Disturbance from roads and pads is temporary and in this environment, reclamation is very successful which returns the area to an unroaded condition within a few years.

Summary

The roadless characteristics within the Sunset CRA would be adversely impacted over the short-term from construction activities associated with the well pads and access to them. Impacts would generally be short term (life of the project) and would return to baseline conditions after the roads and well pads are rehabilitated.

Figure 3.30d. Typical MDW pad and access road at the West Elk Mine just after interim reclamation (2 images)

Figure 3.30e Typical MDW (same pad as that on right in Figure 3.30d) at the West Elk Mine with exhaust fan

Figure 3.30f. MDW pad at the West Elk Mine during final reclamation (recontoured and spreading topsoil)

Figure 3.30g. Typical MDW pads and road at the West Elk Mine approximately 3 to 4 years after final reclamation; oak brush is already moving back in (2 images)

Cumulative Effects

Management projects in the Sunset CRA and West Elk IRA have been happening over time. Road construction for mineral exploration and extraction has led to a fragmented landscape. Some of this activity can be traced back to the 1940s. Existing projects currently being implemented may compromise roadless character until approximately 2030.

Livestock grazing and associated improvements also remain active in the area. Some of this work has involved bulldozers, and other heavy equipment, to clear fence lines and create roads to stock ponds and spring developments.

Table 3.2 discusses the reasonably foreseeable surface disturbances. This analysis projects 48 methane drainage wells, approximately 1 acre each, to be on the landscape for 2-3 years. It also projects about 6.5 miles of temporary roads to construct the wells and for exploration and other associated purposes. These temporary roads will be on the landscape for 2-6 years, depending on the required uses. There will also be some reasonably foreseeable surface subsidence from the underground activity. This could take place on approximately 2,400 acres. Subsidence could be at a depth of 8 feet.

Alternative 1 would not result in any additional impacts to roadless characteristics in the Sunset CRA and the larger West Elk IRA. Alternative 2, if technology and the economics of helicopter drilling changed, could result in additional well pads across the landscape which would adversely impact roadless characteristics over the short-term. Alternative 3 would result in additional impacts, as described above. This should be viewed in the context of an area already exhibiting impacts of past and continuing management, resulting in fragmentation. Additional impact from Alternative 3 would likely be temporary because of the rigorous standards for decommissioning and rehabilitation in the Colorado Roadless Rule.

Consistency with Forest Plan and Other Laws

Alternative 2 is consistent with the 2001 Roadless Area Conservation Rule which was reinstated by the Circuit Court October, 2011 and the injunction lifted in February, 2012 by the District Court. Alternative 3 is consistent with the proposed Colorado Roadless Rule. Alternatives 2 and 3 conform to the overall guidance given in the LRMP, as amended (1991), which encourages environmentally sound energy and mineral development. In compliance with the GMUG Forest Plan, the Unsuitability Criteria for coal mining in 43 CFR 3461 was applied to the coal lease modification areas. None of the lands were found to be unsuitable based on the unsuitability criteria. No additional restrictions or need for stipulations were identified as a result of applying the criteria (Appendix B).

3.31 Heritage Resources

Affected Environment

A total of three previous cultural resource inventories have been conducted within the proposed lease area. These inventories were carried out at the intensive level and covered approximately 140 acres. None of these previous cultural resource inventories has identified any cultural resources within the lease modification area.

There is little potential for significant cultural resources to exist within the lease area and no cliffs with overhangs exist that could contain cultural resources that could be disturbed by subsidence resulting from subsurface mining. A cultural resources predictive model for the lease modification area shows that none of the proposed lease modification area is classified as high probability to contain significant cultural resources; 41% of the area is considered to have the lowest possible potential to contain significant cultural resources.

Alternative 1 Environmental Effects

Under the No Action Alternative, there would be no effect to historic properties.

Alternatives 2 & 3 Environmental Effects

Because there is no surface disturbance proposed at the leasing stage, this project has been assessed and found to have no potential to affect historic properties, as defined in regulations 36 CFR 800. Any post-lease activities described in the RFMP (Section 3.2) would not impact any cultural resources that might exist in the lease modification area based on the requirements of lease stipulations which relate to cultural resources.

Cumulative Effects

Subsidence could occur due to future mining activities below the ground surface. Subsidence may impact buried, unidentified sites along the zone of subsidence. However, the potential for impacts to unidentified cultural resources as a result of subsidence is considered minimal.

No cultural resources have been found in the project area to date. No present or reasonably foreseeable actions are likely to affect historic properties as long as measures are taken to complete site-specific surveys before ground disturbance occurs and mitigation is applied to protect any significant cultural resources. Following these measures, there will be no cumulative effects.

Consistency with Forest Plan and Other Regulations

The proposed action is consistent with the National Historic Preservation Act of 1966 (amended in 1976, 1980, and 1992) and all other heritage resource management laws and regulations that support, clarify, or expand on the National Historic Preservation Act. It also complies with Federal Regulations 36 CFR 800 (Protection of Historic Properties), 36 CFR 63(Determination of Eligibility to the National Register of Historic Places, 36 CFR 296(Protection of Archaeological Resources), and Forest Service Manual 2360 (FSM 2360) which provide the basis of specific heritage resource management practices. Several other laws address various aspects of heritage resource management, including NEPA, NFMA, Antiquities Act of 1906, Historic Sites Act of 1935, and the Archaeological Resource Protection Act of1979 as amended in 1988 The National Historic Preservation Act calls for tribal participation in the consultation process (Section 106). The proposed action is consistent with all of the laws listed herein governing cultural and historic resources. Alternatives are consistent with the Forest Plan, Standard Lease Notice for Lands under the Jurisdiction of the Department of Agriculture and all other laws governing archaeological resources.

3.32 Visuals

This section discusses the indirect and cumulative effects of leasing on visual resources.

The GMUG Forest Plan promotes protection, and if possible enhancement, of the visual quality of an area. The Forest Service determined Visual Quality Objectives when the Forest Plan was developed in1983. Since then, the Forest Service has changed to the Scenery Management System (Agricultural Handbook 701). Visual impacts to the lease modification areas will be analyzed based on whether a visual impact is able to be detected from the travelways within the lease modifications and whether or not the viewshed meets the assigned scenic integrity level.

Affected Environment

The project area and cumulative effects study area for visual resources includes the viewsheds potentially affected by the mining activities associated with the proposed action. This area is defined as the lease modification areas.

The lease modifications are located in Gunnison County, generally east of the town of Paonia and southeast of Somerset. Residents and tourists visit the area for scenic and recreation values.

The Scenery Management System, described in FS Agriculture Handbook 701, outlines the process for The Scenery Management System, described in FS Agriculture Handbook 701, outlines the process for inventorying and analyzing aesthetic values on NFS lands (USDA FS, 1995). Scenic resources are defined as attributes, characteristics, and features of landscapes that provide varying responses from and varying degrees of benefits to humans.

Scenic integrity is the state of naturalness or, conversely, the state of disturbance created by human activities or alteration (USDA FS, 1995). Integrity is stated in degrees of deviation from the existing landscape character in a National Forest. Scenic integrity is a continuum ranging over the following five scenic integrity levels:

- Very high (unaltered): Refers to landscapes where the valued landscape character is intact with only minute, if any, deviations. The existing landscape character and sense of place is expressed at the highest possible level.

- High (appears unaltered): Refers to landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
- Moderate (slightly altered): Refers to landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.
- Low (moderately altered): Refers to landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings; vegetative type changes; or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within.
- Very low (heavily altered): Refers to landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings; vegetative type changes; or architectural styles within or outside the landscape being viewed. However, deviations must by shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

Both very high and high scenic integrity levels are for areas where primitive scenic resources are found. Typically, the foreground, middle-ground, and background distance zones have an undisturbed appearance. These areas are more remote and are used for low impact activities, such as hiking. Moderate scenic integrity level areas are for areas where relatively natural scenic resources are found. Typically, the distant middle ground and background distance zones have alterations to scenic resources that are visible but difficult to identify. Some effort is needed to access these areas. Both low and very low scenic integrity levels are for areas where scenic resources are altered by human activities and structures. Typically, the foreground, middle ground, and background distance zones have disturbances to scenic resources that are readily noticeable. These areas are readily accessible due to the presence of roads and are used for high-impact activities, such as OHV recreation. Scenic integrity level objectives identify how scenic resources are to be managed. The objectives vary depending on the location, quality, uniqueness, sensitivity, and desired use of the scenic resources.

Impacts on visual resources can be either positive or negative, depending on the type and degree of visual contrasts introduced to a landscape. Where modifications repeat the general elements of the natural landscape, the degree of visual contrast is lower, and the impacts are generally perceived less negatively. Where modification introduces pronounced changes, the degree of contrast is greater, and impacts are often perceived more negatively.

The lease modification areas have Scenic Integrity Objectives of “moderate” and “moderate/high”.

The lease modifications are not directly visible from a public highway or NFSRs which are secondary travelways and low use areas. However, there may be a concern that some post lease activities could be visible from vistas within the nearby Wilderness.

Alternative 1 Environmental Effects

Under the No Action Alternative, the lease would not be approved. Past and ongoing activities within the lease modification areas would continue such as livestock, wildlife and other trails which may create minor linear disturbances or habitat improvement projects ((BearPaw Rx Burn and Lamborn Wildlife habitat improvement projects in oak and similar habitats) that could alter color, line and form and texture. No impacts to the visual environment from incidental post-lease surface disturbance are expected if the No Action Alternative is selected.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations including those for the protection of visual resources. However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative 3 but slightly reduced in scale because 6.5 miles of road construction would not occur.

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Alternative 3 Environmental Effects

Under the Alternative 3, the Forest Service would consent to leasing, and BLM would modify the leases. Mining activities could occur under the area. Visual impacts would be limited because underground access to the mine would most likely be via existing West Elk Mine. The mining activity itself would likely lead to subsidence. The subsidence report does not indicate any major visual impacts to be expected from mining, subsidence or tension cracks related to the proposed action (Agapito 2005, see Appendix B). The report notes that crack widths of up to 6 inches and lengths up to 300 feet (WWE, 2010) have been observed in the West Elk Mine. The report also notes that subsidence has the potential to activate or increase landslide activity; this has only been documented once at the West Elk Mine, and it has been documented to be a direct result of underground mining in one instance elsewhere in the North Fork Valley Mining District. There would be little to no visual impact on the area because the size of the cracks would not be visible from any travelway, limiting access to the viewshed. There is the slight increase in the possibility of a landslide; however, since landslides occur naturally within the project area and the landslide would be not be a dominant feature of the viewshed, the impact on visual quality would be minimal

There would be no direct impacts on visual resources from this leasing action. However, there may be indirect or cumulative impacts related to future development as described in the RFMP (Section 3.2). During this leasing stage, a stipulation (see Chapter 2 for stipulation language) would be applied to Scenic Integrity levels of “high” or “moderate” within the lease nomination area to protect scenic resources. Post-lease surface disturbances that may be visible included roads and MDWs and associated vegetation removal. However, these should not be visible from public travelways due to distance from travelway, topography and vegetative screening. Use of the lease stipulation for visual resources will further reduce visual impacts. Concerns that these surface facilities may be visible from the Wilderness (although the definition of Scenic Integrity Objectives is viewing from the lease modifications area not into them) should also not be an anticipated impact because post-lease facilities would not be readily visible from any trail due to topography and vegetative screening and application of the lease stipulation.

Cumulative Effects

RFMP activities could result in cumulative impacts on visual resources across lease modification area when combined with other vegetation and ground disturbing projects affecting form, line, color, texture, and pattern of the surrounding area. The heights, type, and color of potential development, together with their placement with respect to local topography, short duration of features on the surface and application of stipulation are factors that would contribute to minimizing the extent of visual intrusion on the landscape.

If the lease modifications are granted effects similar to those described in Alternative 3 could occur on the adjacent private land while mining 5.6 million tons of private coal reserves and on parent leases where additional 3.3 million tons federal coal reserves may be mineable.

Consistency with Forest Plan and Other Regulations

The lease modifications with their lease stipulation are consistent with Forest Plan visual objectives and the Scenery Management System (FS Agricultural Handbook 701)

3.33 Socioeconomics

Affected Environment

The area of influence for the social and economic elements of this EIS includes both Delta and Gunnison counties in west central Colorado. Delta County is the area of influence for the population and demographic component because the majority of employees at the coal mining facilities and their families live within the communities in its jurisdiction. Currently, the West Elk Mine has 378 employees. Gunnison County is included in the economic area of influence because the lease modifications are located within its jurisdiction adjacent to the West Elk Mine operated by MCC. Both Counties receives tax and other revenues from mine operations.

The cumulative impacts area would include both Gunnison and Delta counties. Baseline data for the counties in the area of influence includes population and demographic data as well as current business and economic statistics information for the Information in this section was obtained from the US Bureau of the Census based on

the 2000 census and 2009 Census Bureau data. Additional information was obtained from the Sonoran Institute (2004).

Population

Table 3.33 presents basic population and demographic information for Delta and Gunnison Counties and the state of Colorado. Discussion focuses on Delta County as the area of influence for population and demographic components.

Table 3.33. Population by Category, 2000 and 2010, Delta and Gunnison Counties and the State of Colorado.

Population	Delta County	Gunnison County	Colorado
2000	27,834	13,956	4,302,015
2010	30,952	15,324	5,029,196
% Change	11.2 %	9.8 %	16.9 %
Male (2010)	50.4 %	54.2 %	50.1 %
Female (2010)	49.6 %	45.8 %	49.9 %
Under 5 years	5.7 %	5.6 %	7.3 %
Under 18 years	22.1 %	18.1 %	24.4 %
65 years and over	20.2 %	8.8 %	10.9 %
Percent Minority (2010)	17.0 %	10.9 %	30.0 %
Percent Below poverty (2010)	12.1 %	13.9 %	12.6 %

Source: http://quickfacts.census.gov/qfd/states/08/08051.html, see Reference Section: U.S. Census Bureau 2011.

Delta County comprises 1,142 square miles with 27.1 people per square mile and a total population of 30,952 people in 2010. Delta County grew by almost 11.2% between 2000 and 2010. According to the Sonoran Institute (2004), Delta County grew slower than the state but faster than the nation between 1970 and 2000, with an annual average growth rate of 2.7%. The median age in Delta County is 42.3 years with 21.4% of the population being under the age of 18 and almost 20% being 65 years or older. Over 80% of the people age 25 and older in Delta County have graduated from high school, and just over 17% have graduated from college (US Census Bureau 2001).

The Town of Delta is the largest town in Delta County with a 2000 population of 6,400, an increase of 75% since 1990. Other communities in the county include Cedaredge (2000 population of 1,854), Crawford (2000 population of 366), Hotchkiss (2000 population of 968), Orchard City (2000 population of 2,880), and Paonia (2000 population of 1,497) (US Census Bureau 2000). The 2010 US Census reports that there were 14,572 housing units in Delta County that housed 12,700 households, indicating a vacancy rate of approximately 13%. Only 3.7% of the vacant houses are classified as seasonal, recreational, or for occasional use. Approximately 8% of rental units were classified as vacant. There were 2.35 persons per household. Delta County had a home ownership rate of 74.3% in 2010, well above the state average of 67.6%. The median value of an owner occupied housing unit was $193,900, well below the state average of $236,600 (US Census Bureau 2010).

Local Economic Impacts

The area of influence for economic resources is comprised of Delta and Gunnison counties. Delta County is the county of residence for most of the mining personnel and supports most of the indirect employment that provides supplies and services to mine workers and their families. The indirect businesses that provide support services to the West Elk Mine operations include shipping companies, railroad and rail services, power generating

companies, delivery services, and general supply companies and services. Delta County receives the indirect financial benefit and tax revenue from the indirect businesses that support the mine, and the tax base from the workers, and their families, that reside in the County. Gunnison County is included in the area of influence because the lease modifications are located in Gunnison County, and the county receives royalty and tax revenues from the mine

Gunnison County receives about $2 million annually in tax revenues from the West Elk Mine. Mining companies are the largest property tax revenue sources for Gunnison County. Mining companies are the largest property tax revenue sources for Gunnison County. Gunnison County has identified the areas surrounding the coal mines as the *North Fork Valley Coal Resource Special Area.*

In 2009, Delta and Gunnison Counties, taken together, supported approximately 25,316 full- and part-time jobs, which was an increase of 16,804 jobs from 1970. In Gunnison County, approximately 600 of its 9004 wage and salary jobs are in the mining sector-an increase of 285 jobs since 1970. Mining employment in Delta County in 2000 was not reported in the EPS system or US Census documents because the data was suppressed for confidentiality reasons (Sonoran Institute 2004). In 2009, the unemployment rate in Gunnison County was 4.9 percent, which was much lower than the Statewide average of 8.4 percent for the same period. During the same period, the Delta County unemployment rate of 7 percent was also lower than the Statewide average. (Source: http://www.bls.gov/lau/laucntycur14.txt; see Reference Section: U.S. Bureau of Labor Statistics 2011).

In 2004, the West Elk Mine employed approximately 378 full and part time workers with an annual payroll of approximately $29 million (MCC 2004). Average mining wages in 2001 ($50,705) were more than twice the average wage for other employment sectors in the project area ($23,254) (Region 10 Review, 2003). Arch Coal (MCC's parent company) estimates that for every one coal job 7 service-sector jobs are supported. The West Elk Mine spent approximately $32 million in 2003 locally for materials, supplies, and services; royalty and tax payments totaled approximately $13 million (MCC 2004). Total direct economic benefits associated with the West Elk Mine exceed $70 million annually (USDA Forest Service 2004).

Environmental Justice

Executive Order 12898 (Feb. 11, 1994), *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* was executed to avoid a disproportionate placement of adverse environmental, economic, social, or health effects from Federal actions and policies on minority and low-income populations. Analysis requires the identification of minority and low income populations that may be affected by any of the alternatives.

Low-income populations are households that live below the subsistence or poverty level as defined by local, state, or national government. The Order simultaneously directs Federal agencies to avoid making decisions that discriminate against these communities. Environmental justice means that to the greatest extent practicable and permitted by law, 1) populations are provided the opportunity to comment before decisions are rendered on, and 2) are allowed to share in the benefits of, are not excluded from and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment.

The area of influence for environmental justice is Delta County, Colorado, where the majority of West Elk Mine workers and their families live. Demographic information on ethnicity, race, and economic status is provided in this section as the baseline against which potential effects can be identified and analyzed.

Identification of Minority and Low Income Populations

For purposes of this section, minority and low income populations are defined as follows:

- *Minority populations* are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders.
- *Low-income populations* are persons living below the poverty level. In 2000, the poverty weighted average threshold for a family of four was $17,603 and $8,794 for an unrelated individual. Estimates of these two populations were then developed to determine if environmental justice populations exist in Delta County (see Table 3-32).

In 2009, Delta County had a population of 31,322 persons, of which approximately 5137 (16.4%) were minorities and approximately 3,790 (12.1%) were living below the poverty level. Minority populations were lower in Delta County than in the state of Colorado; the low-income population in Delta County was higher than for the state of Colorado. The Council on Environmental Quality (CEQ) identifies minority and low income groups as EJ populations when either (1) the population of the affected area exceeds 50 or (2) the population percentage in the affected area is meaningfully greater (generally taken as being at least 10% more) than the population

percentage in the general population of the region or state. Neither the minority population percentage nor the low-income population percentage meets the CEQ guidelines. As a result, it is assumed that no environmental justice populations exist within the area of influence, and no impact analysis is required.

Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), recognizes a growing body of scientific knowledge which demonstrates children may suffer disproportionately from environmental health risks and safety risks. These risks arise because (1) children's bodily systems are not fully developed, (2) children eat, drink, and breathe more in proportion to their body weight, (3) their size and weight may diminish protection from standard safety features, and (4) their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Children are seldom present at the coal mining facilities. On such occasions, the coal mining companies have taken and will continue to take precautions for the safety of children by using a number of means, including fencing, limitations on access to certain areas, and provision of adult supervision. No additional impact analysis is required.

Alternative 1 Environmental Effects

Under the No Action alternative, the primary impact would be that the estimated 10.1 million tons of recoverable coal would not be mined. Mining of the reserves at the West Elk Mine would continue at existing rates until the coal reserves are depleted. Job losses, including those directly associated with the mine operations, as well as those associated with secondary jobs supported by the mine, would occur following the cessation of operations. The reductions in jobs and associated salaries, local expenditures, and royalty and tax payments would not be realized until after the reserves are depleted. The revenue (taxes and royalties) generated from the sale of the coal from the lease modifications would be lost.

Reductions in jobs and associated salaries, local expenditures, royalty and tax payments would not be realized until after the reserves are depleted. This alternative would limit the opportunity to realize economic benefits. These benefits could be realized for an additional 10-12 years from federal and private coal reserves. The Federal government (US Treasury) would not receive the rents and royalties associated with mining the coal in the lease modifications

The modifications to the West Elk Mine coal lease also provide access to coal in the parts of the parent lease tracts and private coal reserves; without the approval of the modifications, could this coal would become inaccessible.

Alternative 2 Environmental Effects

Under Alternative 2, the Forest Service would consent to leasing and BLM would modify the leases with stipulations (see Section 2.1). However, under the 2001 Roadless Area Conservation Rule framework, road construction would not be allowed in the modification areas. From a regulatory standpoint MDW pads could be constructed via cross-country travel of heavy equipment or via helicopter transport. If the leases are developed, the effects would be similar to those described for Alternative. Unlike other resources areas analyzed in this document, socio-economics includes an analysis of feasibility of mining from both a technological and economic standpoint. The project file documents some of this analysis and may require additional considerations on behalf of BLM before this alternative could be implemented given current constraints and possibility to negatively impact other federal and private coal leases. If it is developed the impacts would be essentially the same as Alternative 3 except for costs of recovery due to different technology.

However, if it, for any reason, is not developed (i.e., not coal mined), even if leased, this could limit the opportunity to realize economic benefits for the government and the mining sector. Some benefits would still be realized for an additional 10-12 years from federal and private coal reserves. The Federal government (US Treasury) would not receive royalties associated with mining the coal in the lease modifications. These effects are consistent with the financial effects on coal mining described in the 2001 Roadless Area Conservation Rule and its associated FEIS. This inability to mine would also cause a direct impact to other coal reserves and

underground access to them. This effect would extend beyond the Forest boundary to fee coal reserves because of the orientation of private lands in relationship to the coal seam and the lease modifications. An estimated 5.6 million tons (977 acres) of fee coal could be bypassed on private lands with this alternative with associated royalties and effects on mining sector (reduced by approximately 9 months). It also extends to 3.3 million tons of coal on exiting federal parent leases that would rely on these modifications for development of longwall panels. See cumulative impacts section for additional quantification of impacts.

Mining of the reserves at the West Elk Mine would continue at existing rates until the coal reserves are depleted. Reductions in jobs and associated salaries, local expenditures, royalty and tax payments would not be realized until after the reserves are depleted.

Benefit-Cost Analysis

The field of benefit-cost analysis attempts to take a holistic inventory in relation to the implementation of the Alternative 2 (for further discussion of assumptions see Alternative 3 discussion below). The overall economic benefits are weighed against the overall economic costs, taking a wider view than that of the local economic impacts. Specific to Alternative 2, 1.6 years (19 months) of coal mining activity was examined, with the following conclusions:

Benefits/Costs (depending on mining reserves or not) under the 2001 rule:

- Approximately $8 million in GHG emissions avoided/incurred [tons of CO_2 equivalent methane * $21 per ton of CO_2) (Interagency Working Group 2010)];
- Approximately $404 million bypassed/recovered from coal (at $40/ton)
- Approximately $46.4 million bypassed/recovered for payroll;
- Approximately $64.2 million in material, supplies, and services bypassed/recovered;
- Approximately $32 million in royalties bypassed/recovered (at 8%)

Alternative 3 Environmental Effects

Under Alternative 3, the West Elk Mine would continue mining operations using the existing workforce, equipment, and facilities. Assuming that the coal in the lease modifications is approved and MCC uses the existing West Elk Mine operations and facilities, there would be no new or added employment at the West Elk Mine. No additional demand for housing or municipal services would be anticipated. Mining operations would be extended throughout the period required to mine recoverable coal reserves in the E Seam, or approximately 19 months (1.6 years) of mining at the present extraction rate. BLM estimates that the E Seam coal in the lease modifications would be mined interspersed with coal from existing leases from about 2013 to 2016 and notes that some variations to these timeframes may occur based on permitting, unforeseen mining or geologic circumstances, coal contract variability, etc (BLM 2009). This extension of mining operations would also extend the annual payroll, local expenditures, and taxes and royalty payments for approximately 1.6 years. The direct economic benefits associated with continued mining would equal approximately $5.83 million per month (USDA FS 2004), which equates to approximately $110.6 million for the 19 month life of mine extension. The BLM receives annual payments from coal lease holders based on rents at not less than $3.00 per acre. The rental rates are specified in the lease. Royalty payments are 8% of the value of the coal removed from an underground mine (43 CFR 3473). Royalties from the Federal coal are distributed in the following way: 50% returns to the Federal treasury in the general fund. The other 50% is returned to the State where the coal was mined, with a portion of that percentage being returned to the county where the coal was mined. In Colorado, those funds are managed by the State Department of Local Affairs in the Energy Impact Fund. These monies are distributed on a grant-like basis to counties affected by energy resource development for community benefit projects.

The cost to the West Elk Mine of implementing control measures in the form of stipulations as part of this alternative would be minor. The costs would not significantly reduce the economic benefit to the local economy.

Benefit-Cost Analysis

The field of benefit-cost analysis attempts to take a holistic inventory in relation to the implementation of the Proposed Action. The overall economic benefits are weighed against the overall economic costs, taking a wider view than that of the local economic impacts. For the proposed coal lease modifications, 1.6 years (19 months) of additional coal mining activity was examined, with the following conclusions:

Benefits:

- Approximately $404 million recovered in coal (at $40/ton)
- Approximately $46.4 million in payroll;
- Approximately $64.2 million in material, supplies, and services;
- Approximately $32 million in royalties (at 8%)

Costs:

- Approximately $8 million in GHG emissions [383,000 tons of CO_2 equivalent methane * $21 per ton of CO_2) (Interagency Working Group 2010)];
- Minor costs due to 72 acres of disturbance on National Forest System Lands (resulting in temporary impacts to hunting, recreation, aesthetics, and livestock grazing)

Cumulative Effects

On a cumulative basis, if the lease modifications were not approved, and not offered for sale, coal mining in the North Fork of the Gunnison River Valley would continue until existing reserves are depleted. At that point, the mining employment sector would be terminated. Mining the coal reserves in the lease modification would increase the life of mine by up to 19 months, assuming that the modification was approved and the coal was extracted utilizing the West Elk Mine operation and facilities interspersed with existing leases. This area would be mined over the course of approximately 3 years. In addition to these increased reserves, if approved, the mine could likely operate 16.4 months longer (already included in life of mine estimates) by developing 3.3 million tons of coal on existing parent leases and 5.6 million tons of coal on private leases that would become accessible. The cumulative social and economic effects of past, present and reasonably foreseeable actions in the North Fork of the Gunnison River Valley relative to coal mining operations would be to extend the mining employment sector proportionately to the length of the remaining reserves. Conversely if the modifications were not approved, the result could be a 16.4 month reduction in the current life of mine as 3.3 million tons of coal on existing parent leases and 5.6 million tons of coal on private leases would become unmineable without the lease modifications due to orientation of those tracts relative to the coal seam.

Depending on which alternative is selected, determines whether it is benefit or cost.

Benefits/Costs:

- Additional $348.7 million from coal (at $40/ton)
- Additional $40.1 million for payroll;
- Additional $55.1 million for material, supplies, and services;
- Additional $12-16 million in royalties to Mount Gunnison Fuel Company (estimated at 3-4%)
- Additional $6.9 million in GHG emissions [383,000 tons of CO_2 equivalent methane * $21 per ton of CO_2) (Interagency Working Group 2010)];
- Additional minor costs due to disturbance on National Forest System Lands parent leases (resulting in temporary impacts to recreation, visuals, and livestock grazing,) or on private lands.

Consistency with Forest Plan and Other Laws

The GMUG Amended Land and Resource Management Plan (Forest Plan), dated September 1991, and the BLM Uncompahgre Basin Resource Management Plan (RMP), dated July 1989, made provisions for coal leasing subject to the application of the coal unsuitability criteria established in 43 CFR 3461.

3.34 Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Unless otherwise specified, short-term is the life of the project. Long-term effects are defined as those that would occur after coal is mined. Short-term use of environment would not affect the long-term productivity of the proposed lease modification area. Approximately 4% of lease modifications may be disturbed by action

alternatives assuming the area is mined under a RFMP (Section 3.2). After all disturbed areas have been reclaimed, the same resources that were present prior to the project would be available, and reclamation efforts would re-establish vegetation and would mitigate any long-term impacts to the environment, except for the underground coal that would be removed. The leasing of the proposed modifications would not preclude some ongoing uses of the area (e.g., livestock grazing, recreational use, etc.) and the subsequent long-term use of the area for any purpose for which it was suitable prior to the project.

3.35 Unavoidable Adverse Effects

Approval of the lease modifications may result in subsidence of the land area and possible surface cracks as the coal is mined. Subsidence is addressed as it applies to any of the resource areas in Chapter 3.

3.36 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a road.

NEPA requires identification of irreversible and irretrievable commitments of resources. Irreversible resource commitments are those that cannot be reversed (loss of future options). Irretrievable resources commitments are those that are lost for a period of time. Irreversible or irretrievable commitments of resources where identified in these resource areas:

Topographic & Physiographic Environment, Geology, Soils, Watershed

- Once the coal is removed, it cannot be replaced, which is an irreversible commitment of the mineral resources.
- Removal of coal will cause subsidence, which is an irreversible modification of the topography.
- Landslides or other mass movement, are difficult to fully reclaim and may result in permanent landscape features. Stipulations on the coal lease, along with mitigation measures required by the Colorado DRMS mining permit will reduce, but not eliminate these adverse impacts.

Vegetation, Threatened & Endangered Species, Sensitive Species, Management Indicator Species,

- Any vegetation removed in the areas of the RFMP would result in an irretrievable resources commitment. These areas would revegetate within a few years, so the commitment is not irreversible.

3.37 Cumulative Effects

All cumulative effects are addressed specific to each resource area in Chapter 3. However, the following summary applies to the greater North Fork Valley. The geographic scope is focused on the North Fork Valley from east of the town of Delta, north to the Mesa/Delta County line, east to the Pitkin County boundary, then south and west along the watershed for the North Fork of the Gunnison River. This area is approximately 566,700 acres in total with National Forest being 57% (322,400 acres), BLM 11% (61,150 acres), and private land 32% (182,150 acres). A portion of the private land has the mineral estate reserved to the United States in the patents.

Past Actions

The primary existing (past) disturbances within the proposed lease are associated with mining, oil and gas, livestock grazing, and residential/agricultural development.

Historic mining activities over the past century include the following: Hawks Nest Mine; Oliver Mine No. 1 and No. 2; Bear Mine No. 1, No. 2, and No. 3; Edwards Mine; USS Steel Mine; Blue Ribbon Mine; King Mine; Farmers Mine; Oxbow Sanborn Creek; and Bowie No. 1 Mine (a.k.a. Orchard Valley Mine).

Over the last century, there has been noticeable subsidence in a number of areas above the historic mines. However, there has been no known damage to overlying resources or to structures attributable to this subsidence. Subsidence may have aggravated or contributed to some landslide movements, but this is difficult to identify given the pre-mining instability of many areas of the valley.

Past oil and gas activity within the region has included coal-bed methane wells and conventional gas wells. The wells within approximately 20 miles of the lease modification areas include: 56 total wells drilled. 25 are on private surface/private minerals; 11 are split-estate wells; 20 are on U.S. Forest Service; and no wells are on BLM surface and 20 wells are producing and 31 are shut-in.

Present Actions

Present actions are focused on mining, oil and gas, livestock grazing, and residential/ agricultural development. Table 3.37 contains recent production data for the three coal mines in the North Fork Valley.

Table 3.37 - Raw Coal Production - North Fork Valley (NF) - BLM-UFO 1 Year Averages

Average based on:	Bowie No. 2	Elk Creek	West Elk	Totals (NF)
5 Year	2,808,556	4,378,814	5,721,944	12,909,314
1 Year	1,873,357	3,495,575	6,499,048	11,867,980
Periods end Sept. 30, 2011 NOTE: The total yearly production for the NF is expected to remain about the same between 12 and 13 million tons. This would result in approximately 3 unit trains per day of 105 cars per unit entering and leaving the NF. Each of these mining operations control coal reserves with a mix of Federal and fee coal; however, 90 percent or more of local production is Federal. As mining progresses, only Federal coal will be available in the reserve base.				

Bowie No. 2 was opened in 1997 as a room-and-pillar mine but converted to a longwall system in late 1999. It is located northeast of Paonia and is operated by Bowie Resources, LLC with a train loadout northeast of Paonia. A coal lease modification to lease COC-036955 for 160 acres was issued on January 21, 2011 for the Bowie No. 2 Mine. There are 14,543 acres permitted in the combined permits of the Bowie No. 1 and No. 2 accessed by the Bowie No. 2 mine.

The Elk Creek Mine is a longwall operation north of Somerset, operated by Oxbow Mining, LLC, with a train loadout immediately north of Somerset. There are 13,429 acres permitted.

The West Elk Mine is a longwall operation located south and east of Somerset and is operated by Mountain Coal Company with a loadout about 1 mile east of Somerset. There are 17,155 acres permitted and the mine is about the 7th largest underground longwall coal mine in the U.S.

The North Fork Branch of the Union Pacific Railroad operates exclusively to serve these coal mines. This line branches from the main line in Grand Junction and passes through Delta, Hotchkiss, Paonia, and Somerset.

On a cumulative analysis basis, the West Elk Mine, as well as the other 2 underground coal mines operating in the North Fork Valley, have a considerable impact on the local economy. Approximately 1,028 coal miners are employed directly by the 3 mines, and an additional 1,748 people in the local area derive their employment from the miner's income, as well as from the purchases of supplies by the mines themselves. The West Elk Mine is responsible for approximately one-third of this overall effect, and the proposed lease modification will allow the mine to continue operations for 19 additional months. If the lease modifications were not approved, and not offered for sale, nearly 1,000 people in the local area would lose their employment 19 months sooner than they otherwise would.

Continued operation of the coal mines in the North Fork Valley provide a direct beneficial impact to the local economy. Impacts to businesses that do not depend upon the direct business from resource extraction are more difficult to measure. There may be minor impacts resulting from the continued mining of non-renewable resources in the North Fork Valley. The impacts would be temporary, consistent within the timeframe of the mining operations.

Oil and Gas Leasing. There are approximately 418,469 total acres of federal oil and gas mineral estate within the cumulative impacts area. Approximately 124,192 unleased acres are within inventoried roadless areas which,

due to on-going litigation, may have surface use restrictions related to road building if ever nominated for leasing. Overall, there are 173,646 acres currently leased. This includes 54,580 acres of inventoried roadless areas which were leased prior to implementation of the USFS roadless rule. If these pre-2001 leases expire and are subsequently leased again, they will have surface use restrictions for whatever roadless rule may be in place. Approximately 120,631 acres of Federal oil and gas mineral estate remains available for nomination to be leased at this time.

Reasonably Foreseeable Actions

Underground coal mining would continue in the North Fork Valley. In addition to existing coal leasing and exploration activities, the following are reasonably foreseeable actions:

- Oxbow Mining, LLC (Elk Creek Mine) applied for both a 786-acre lease by application with surface disturbance of approximately 5.63 acres on public lands and a 157-acre coal lease modification with no surface disturbance on the GMUG.
- Mountain Coal Company (West Elk Mine) applied to construct, operate, and reclaim up to 159 E Seam methane drainage well (MDWs) sites that would support 171 individual MDWs, and use or construction of approximately 26.1 miles of roads within the GMUG approved.
- Oxbow Mining, LLC (Oak Mesa Project – coal exploration license) - a proposal to drill 43 exploration drill holes on private and federal lands into federal subsurface holdings. The entire exploration area covers about 13,873 acres, and temporary surface disturbances from road and pad construction would occur on about 32.86 acres.
- Bowie Resources, LLC (Bowie No. 2 Mine) applied for two lease modifications adjacent to current leases to the north under private and public lands and are in the first stages of NEPA analysis. They would add approximately 505 acres, and temporary surface disturbances from road and pad construction would occur on about 16.6 acres.

Additional actions including coal lease modifications and new coal lease applications could be expected in the North Fork Valley. These factors may affect how long mining would continue in this area; however, it is likely that mining would continue for another decade, if not more.

Pending oil and gas activity includes 22 total permits.

- 9 shale well permits;
- 8 coal-bed methane wells; and
- 5 coal mine methane wells.

It is difficult to forecast future oil and gas development within the cumulative impact assessment region. The area is seeing an increase in development which exceeds the past average. Activity increases are due to changes in technology for the drilling and development of the unconventional mancos shale wells and wells used to capture methane from coal mines. It is estimated that the area will average 20 new wells per year (assumes at least 2 wells per pad – 10 new pads per year). This will then create approximately 68 acres of new disturbance per year from oil and gas development.

SG Interests I, Ltd (SG) has proposed a 150 gas well Master Development Plan to develop mineral leases they hold within the Bull Mountain Unit located in Gunnison County, Colorado. SG is proposing to drill and produce 150 wells from approximately 41 individual well pads and associated infrastructure. Approximately 50% of the wells are targeting coalbed methane production and the other 50% will be exploring other potentially productive natural gas zones encountered by drilling into other geologic zones in the area of the Bull Mountain Unit.

August 2012 Oil and Gas lease sale: The BLM is has prepared a draft EA regarding the nomination to lease nearly 30,000 acres of federal oil and gas mineral estate to be included in the Colorado BLM August 2012 Quarterly Lease Sale. 22,000 acres of the proposed nominations lie within the cumulative impacts assessment area of this EA.

Other Activities

Other past, present and reasonably foreseeable development activities within the proposed lease modification areas and vicinity include:

- Historically, fruit orchards along the valley floor and low mesas have been important to the local Paonia economy. More recently, vineyards have replaced some orchards in the area.
- Sheep and cattle are grazed in pastureland around Paonia and also at higher elevations near the mining operations during the summer.
- There are a number of water storage reservoirs and canals around the North Fork Valley to serve agriculture and domestic uses.
- WAPA operates the Curecanti-Rifle 230/345 kV transmission line that parallels Terror Creek.
- Residential developments in the area around the communities of Paonia, Hotchkiss, Crawford, and Delta have been growing in population, with many new houses being built. Most of this development has been down-valley from the coal mines in broader portions of the North Fork Valley. This development has increased the traffic load and demand for maintenance on State Highway 133.
- There is little developed recreation in the area; however, the area is widely used for dispersed recreational activities, such as hunting, four-wheeling, hiking, biking picnicking, horseback riding, snowmobiling, and sight-seeing.
- Forest treatments timber sales have been limited in the area.
- Cumulatively, impacts from the proposed lease modifications could include small increases in deposition of sediment or pollutants into surface waters, increased subsidence within the North Fork Valley, low increase in cumulative emission of GHGs from mine ventilation, and a slight increase in water withdrawal from the Colorado River system that may potentially impact several federally-listed species of fish in downstream portions of the North Fork and Gunnison Rivers. None of these impacts is expected to be major as analyzed in the specific resource sections. Impacts resulting from the proposed lease modifications could add incrementally to impacts from the other activities discussed above, resulting in a low-level increase in noise, human presence, soil erosion, invasive weeds, wildlife habitat loss, and vegetation loss or conversion. These impacts are discussed in the sections above. Cumulative impacts associated with coal mining are not anticipated to be significant.

3.38 Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental…statements concurrently with and integrated with …other environmental review laws and executive orders."

- Consultation with State Historical Preservation Office was not required at this time due to surveys reporting no heritage resources.
- U.S. Fish and Wildlife Service was consulted in accordance with the ESA implementing regulations for projects with threatened or endangered species
- DRMS is concurrently working with MCC on permitting requires that tie to this analysis
- (Intentionally left Blank)

CHAPTER 4. CONSULTATION AND COORDINATION

4.0 Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this EIS:

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Trey Schillie, Regional Policy Analyst (roadless consultations, reviewer)

Matthew Judd, WO/NFS/EMC - NEPA Services Group (reviewer, NEPA contacts/databases)

John Rupe, Regional Planner (appeal processes during EA)

Kristen Sexton, District Ranger on South Park Ranger District (reviewed for OGC, appeal review team on EA)

Lois Witte/Ken Capps, Office of General Counsel (review and NEPA process)

Tom McClure, Acting Regional Director Physical Resources (inter-agency coordination and review)

Glenn Casamassa, Forest Supervisor Arapaho and Roosevelt National Forests (appeal recommending officer reversing decision on EA)

Charles Richmond, former GMUG Forest Supervisor (issued decision on EA)

Sharon Friedman/Kathy Kurtz, Regional Director/Acting Director Strategic Planning (review, roadless consultation)

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Lee Ann Loupe, GMUG External Affairs Officer (Congressional liaison, media contact, FOIA coordination)

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Will Allison/Martha Rudolph, CDPHE (applicability of Tailoring Rule)

Federal, State, and Local Agencies Consulted:

BLM- Uncompahgre Field Office and Colorado State Office

OSM

USFWS

Colorado Division of Wildlife

Colorado Division of Reclamation, Mining and Safety (DRMS)

Colorado Department of Natural Resources

Colorado Department of Public Health and Environment (CDPHE)

US EPA, Region 8

Mine Safety and Health Administration

USFS Region 2

USFS Washington Office

Tribes:

Federally recognized Native American tribes have a unique legal and political relationship with the government of the United States. Executive Order (EO) 13175 requires Federal agencies to coordinate and consult on a government-to-government basis with sovereign Native American tribal governments whose interests may be directly and substantially affected by activities on federally administered lands. Other laws, rules, regulations, policies, standards, and guidelines require consultation with Native American tribes in order to identify cultural values, religious beliefs, traditional practices, and legal rights that could be affected by BLM actions on public lands. These include the National Historic Preservation Act of 1966 (NHPA), the American Indian Religious Freedom Act of 1978 (AIRFA), the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), DOI Secretarial Order No. 3215 (DOI 2000), 512 Department Manual Chapter 2 (DOI 1995), BLM Manual H-8160-1, Native American Coordination and Consultation (BLM 1994), and EO 13007, Indian Sacred sites.

Consultation with Native American tribes is also part of the scoping process required by the NEPA, as well as a requirement of the FLPMA. Tribal consultation regarding this EA was conducted by the USFS, GMUG National Forests. The following Native American Tribes were consulted:

Ute Mountain Utes

Southern Utes

(Northern) Utes

Others:

Mountain Coal Company

Arch Coal

Mount Gunnison Fuel Company

4.1 Distribution of the DEIS

A weblink to the DEIS has been distributed to same 800+ individuals listed in Section 1.4 who specifically requested a copy of the document and those who submitted substantive comments during scoping; hardcopies or CDs were sent to required agencies and those who requested them. Mailing list has been updated since the NOI was distributed due to returned mail for invalid addresses or no forwarding information. The document is posted to the Forest's webpage.

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INDEX

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REFERENCES CITED

Chapter 1

USDA Forest Service, 1991. Amended Land and Resource Management Plan, Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO

USDI BLM, 1989, Resource Management Plan, Bureau of Land Management Uncompahgre Field Office, 1989 as amended.

Chapter 2

(Other references are given by web links in the document text)

BLM analysis, 2007

Chapter 3

(Other references are given by web links in the document text)

USDI BLM, 2008

Nabors Drilling, 2012, Personal Communication with the Paonia Ranger District.

Air Quality, Greenhouse Gases & Climate Change

IPCC AR4 WGI, 2007**,** IPCC Fourth Assessment Report: Climate Change 2007**,** Working Group I Report The Physical Science Basis, found at:http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html

CCSP SAP 3.3, 2008, Weather and Climate Extremes in a Changing Climate, SYNTHESIS AND ASSESSMENT PRODUCT 3.3, HTTP://WWW.CLIMATESCIENCE.GOV/LIBRARY/SAP/SAP3-3/DEFAULT.PHP

Topography, Geology, Watershed, Soils

Agapito and Associates, Inc. 2005. Dry Fork Federal Coal Lease by Application Subsidence Evaluation.

Cryer, D.H., Hughes, T.J. 1997. Soil Survey of Grand Mesa – West Elk Area, Colorado. Parts of Delta,

HydroGeo. 2003. West Elk Mine 2002 Annual Hydrology Report, HydroGeo, Inc. report for Mountain Coal Company, April.

HydroGeo. 2009. West Elk Mine 2009 Annual Hydrology Report, HydroGeo, Inc. report for Mountain Coal Company.

Koontz, W. 2003. West Elk Mine Geologist, Mountain Coal Company Personal Communication with Liane Mattson, USDA Forest Service, November 2003.

WWE. 2010, Subsidence and Geologic Field Observations, Wright Water Engineers, Report to Mountain Coal Company.

USDA Forest Service. 2003. Environmental Assessment: West Flatiron Federal Coal Lease-By- Application Tract, COC-67011. USDA Forest Service, Grand Mesa, Uncompahgre and Gunnison National Forest. Pp. 3-16.

Threatened and Endangered Species

CDOW (Colorado Division of Wildlife). 2005. General Locations of Lynx (Lynx Canadensis) Reintroduced to Southwestern Colorado from February 4, 1999 through February 1, 2005. http://wildlife.state.co.us/NR/rdonlyres/F92E6FCD-BCB5-4711-8EE6-A9398EA77999/0/LynxLocations_Feb2005.pdf

CDOW, 2005a, Lynx Update, August 15, 2005; http://www.utahwolf.net/assests/Aug1505Lynxfullupdate.pdf

CDOW. 2006. Lynx Update, November 8, 2006. http://wildlife.state.co.us/NR/rdonlyres/56F725F1-39DD-45E2-8F6F-5EE51AD03E2F/0/LynxUpdateNov92006.pdf

CDOW, 2009, Lynx Update, May 25, 2009; http://wildlife.state.co.us/NR/rdonlyres/1E7C95D0-53F3-41EB-82DD-26134C0FF261/0/LynxUpdateMay252009.pdf

Gunther, K.A., M.J. Biel and H.L. Robison, 1998. Factors Influencing the Frequency of Road-killed Wildlife in Yellowstone National Park. In Evink G.L., P.Garrett, D. Zeigler and J. Berry eds. 1998. Proceedings of the International Conference on Wildlife Ecology and Transportation. FL-ER-69-98. Florida Department of Transportation, Tallahasee, FL. Pgs 32-42.

Ruediger, B. et al. 2000. Canada Lynx Conservation Assesment and Strategy. 2nd Edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. pgs 1-3, 1-10, 1-11, 1-13.

Ruggerio, L.F., K.B. Aubry, S.W.Buskirk and others. 2000. Ecology and Conservation of Lynx in the United States. University Press of Colorado, Boulder, CO. pgs 122, 183-191

USDA FS, 2005. Canada Lynx Conservation Agreement; US Forest Service and US Fish and Wildlife Service. USFS Agreement #00-MU-11015600-013.

USDA Forest Service 2008. Southern Rockies Lynx Management Direction Record of Decision. Denver, CO.

USDI FWS, 2005, Recovery Outline; Contiguous United States Distinct Population Segment of the Canada Lynx, 9/14/05. US Fish and Wildlife Service, Helena, Montana. 21pp.

USDI FWS, 2005a, Fish and Wildlife Service Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx; Proposed Rule. Federal Register, Vol. 70, No. 216, 68303.

USDI FWS, 2006, Fish and Wildlife Service Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Contiguous Unites States Distinct Population Segment of the Canada Lynx; Final Rule. Federal Register, Vol. 71, No. 217, 66008-66061.

USDI FWS, 2007. Letter of Concurrence for Deer Creek Shaft and E-Seam Methane Drainage Well Project. ES/CO Fish and Wildlife Service :GMUG 65413-2007-I-0141.

USDI FWS, 2008. Fish and Wildlife Service Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx (Lynx canadensis); Proposed Rule. Federal Register, Vol. 73, No. 40, 10860-10896.

USDI FWS, 2008b. Fish and Wildlife Service Species list for the Grand Mesa, Uncompahgre, and Gunnison National Forests. May 9.

Sensitive Species/MIS

Beauvais, G.P. and J. McCumber. (2006, November 30). Pygmy Shrew (Sorex hoyi): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/pygmyshrew.pdf [16Feb 2007].

Braun, C.E., J.H. Enderson, M.R. Fuller, Y.B. Linhart and C.D. Marti. 1996. Northern Goshawks and Forest Management in the Southwestern United States. Wildl. Soc. Tech. Rev. 96-2. pg 9.

CDOW (Colorado Division of Wildlife). 2010. 2009 Elk Harvest Summaries. http://wildlife.state.co.us/NR/rdonlyres/A92D1424-3F8A-4649-B115-C13C132255BF/0/2009StatewideElkHarvest.pdf

CDOW 2010a. Elk 2008 Post-hunt Population Estimates. http://wildlife.state.co.us/NR/rdonlyres/5DF3370C-F24F-4875-9B5E-9FF5DA3889CF/0/2008posthuntElkpopulationestimates.pdf

Edge, W.D. and C.L. Marcum. 1985. Movements of elk in relation to logging disturbances. Journal of Wildlife Management 49(4): 926-930.

Fitzgerald, J.P., C.A. Meaney and D.M. Armstrong. 1994. Mammals of Colorado. University Press of Colorado. Niwot, CO. pgs. 81-82

Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado, a Colorado Field Guide. Second Edition. University Press of Colorado, Niwot, CO. pgs 82-85, 90-98, 145-151, 375-386,

Hayward, G.D. and J. Verner, Technical Editors. 1994. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. GTR-RM-253. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Pgs. 41, 119.

Hillis, J.M., M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan and D.W. McCleerey. 1991. Defining Elk Security: the Hillis paradigm. Elk Vulnerability Symposium, Montana State University, Bozeman, MT. April 10-12, 1991. pgs 38-43.

Hoover, R.L. and D.L. Wills, eds. 1984. Managing Forested Lands for Wildlife. Colorado Division of Wildlife in cooperation with USDA Forest Service, Rocky Mountain Region, Denver, CO. 46-50, 58-60.

Kennedy, P.L. (2003, January 2). Northern Goshawk (*Accipiter gentiles atricapillus*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/northerngoshawk.pdf

Kingery, H.E. ed. 1998.Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife. Denver, CO. Pgs 210-211, 228-229, 236-237.

Lyon, L.J. 1979. Habitat Effectiveness for Elk as Influenced by Roads and Cover. Journal of Forestry. October 1979. p 658-660.

Monarch, John, 2010. Personal Communication. Memo re: Lease Modification Area – March 15, 2010 survey data summary. Available in project file.

Mueggler, W.F. 1985. Vegetation Associations *in* Aspen: Ecology and Management in the Western United States, DeByle and Winokur, eds. General Technical Report RM-GTR-119. Ogden, Utah: USDA Forest Service, Rocky Mountain Research Station. Pg. 45

Phillips, G.E. and A.W. Alldredge. 2000. Reproductive success of elk following disturbance by humans during calving season. Journal of Wildlife Management 64(2): 521-530.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management Recommendations for the Northern Goshawk in the Southwestern United States.

Rowland, M.M., M.J. Wisdom, B.K. Johnson and J.G. Kie. 2000. Elk distribution and modeling in relation to roads. Journal of Wildlife Management 64(3): 672-684.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski. 1994. The Scientific Basis for Conserving American Marten, Fisher, Lynx and Wolverine in the Western United States. General Technical Report RM-254. Ft. Collins, CO. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Pgs 8, 24-27, 114-115.

Sauer, J. R., J. E. Hines, and J. Fallon. 2008. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008.* USGS Patuxent Wildlife*, Laurel, MD*

USDA Forest Service, 2011. FSM 2600 – Wildlife, Fish, and Sensitive Plant Habitat Management Chapter 2670 – Threatened, Endangered And Sensitive Plants And Animals; Supplement No.: 2600-2011-1. June 10, 2011. http://fsweb.r2.fs.fed.us/rr/R2_TES_Site_2007/sensitive/2670.doc

USDA Forest Service 2010. Rocky Mountain Region Threatened, Endangered, Proposed, and Sensitive Species. http://fsweb.r2.fs.fed.us/rr/R2_TES_Site_2007/sensitive/matrices/2010_r2_tes_by_unit.doc

USDA Forest Service, 2010a. Region 2 Regional Forester's Sensitive Species List. http://www.fs.fed.us/r2/projects/scp/sensitivespecies/index.shtml

USDA Forest Service, 2010b. Region 2 Species Conservation Assessments. http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml

USDA Forest Service 2010c. MCC Lease Mod Habitat Verification. Internal document, available in project file.

USDA Forest Service. 2005a. Sensitive Species Evaluation Forms. www.fs.fed.us/r2/projects/scp.

USDA Forest Service 2005b. Rocky Mountain Elk (Cervis elaphus nelsoni) Species Assessment Draft. Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDA Forest Service 2005c. Environmental Assessment, Management Indicator Species, forest Plan Amendment to the LRMP for the Grand Mesa, Uncompahgre, and Gunnison National Forests. March, 2005. Delta, CO.

USDA Forest Service 2005d. Merriam's Turkey (Meleagris gallapovo merriami) Species Assessment. Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDA Forest Service 2005e. Red-naped Sapsucker (Sphyrapicus nucahlis) Species Assessment. Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDA Forest Service 2005f. Northern Goshawk (Accipiter gentilis) Species Assessment. Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDA Forest Service 2005g. American Marten (Martes americana) Species Assessment. Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDA Forest Service, 2001a. Management Indicator Species Assessment, Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDA Forest Service. 1994. Habitat Capability Model, Rocky Mountain Region, Documentation and Users Guide. USDA Forest Service, Rocky Mountain Region, Renewable Resources, Lakewood, CO. p 4-6.

USDA Forest Service. 1991. Amended Land and Resource Management Plan, Grand Mesa, Uncompahgre, and Gunnison National Forests. Delta, CO.

USDI Fish and Wildlife Service, 2005. Revised 12-month finding for the Southern Rocky Mountain Distinct Population Segment of the Boreal Toad (*Bufo boreas boreas*). Washington, D.C. Federal Register. Volume 70, Number 188: pages 56680 – 56684.

Wiggins, D. (2005, March 31). Purple Martin (*Progne subis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/purplemartin.pdf

Visuals

(Other references are given by web links in the document text)

USDA FS, 1995, Landscape Aesthetics – A Handbook for Scenery Management. Agriculture Handbook Number 701.

WWE. 2010, Subsidence and Geologic Field Observations, Wright Water Engineers, Report to Mountain Coal Company.

Socioeconomics

(Other references are given by web links in the document text)

BLM. 2009

MCC, 2004, Information on Mountain Coal Company West Elk Mine customers, staffing, payroll, royalties and taxes, and economic impact, 2004.

Sonoran Institute, 2004. Population, Employment, Earnings, and Personal Income Trends. Sonoran Institute, Economic Profiling System: Gunnison County and Delta County, Colorado.

US Census Bureau, 2000,

US Census Bureau, 2001,

US Census Bureau. 2002. Press release regarding increased use of SUVs. Available online at http://www.census.gov/Press- Release/www/releases/suv2.xls

USDA FS. 2004. Sylvester Gulch Road Construction/Box Canyon Coal Methane Drainage Wells/Box Canyon Shallow Seismic Reflection Survey Environmental Assessment. Grand Mesa, Uncompahgre, and Gunnison National Forests. January 2004.

APPENDIX A. GER/MER

Combined Geologic and Engineering Report (GER) and Maximum Economic Recovery Report (MER) for Coal Lease Modifications (COC1362 & COC67232)

applied for by Ark Land Company for Mountain Coal Company (MCC)

T. 14 S., R. 90 W., 6th P.M.

by

Desty Dyer

Mining Engineer

Legal Description

The legal description for the COC67232 lease modification tract as applied for was as follows:

T. 14 S., R. 90 W., 6th P.M.
Sec. 11: SWNE,W2SE;
Sec. 14: SESENW, W2NE, W2SE, S2SW, NENESW;
Sec. 15: SESE;
Sec. 22: E2NE;
Sec. 23: NW, W2NE;
Containing 762 acres more or less.

However, after review by USFS minerals and lands staff and their subsequent advice to the applicant and BLM, this tract was revised to avoid any possible overlap on Wilderness to the south. BLM also included area to the east to avoid possible bypass of reserves. The resulting revision is described as follows:

T. 14 S., R. 90 W., 6th P.M.
Sec. 11: SWNE,W2SE;SESE
Sec. 14: E2SENW, NE, SE, S2SW, E2NESW;
Sec. 15: SESE;
Sec. 22: E2NE;
Sec. 23: NW, NWNE;
Containing 921 acres more or less.

The legal description for the COC1362 lease modification tract as applied for was as follows:
T. 14 S., R. 90 W., 6th P.M.
Sec. 10: SE, NESW;
Sec. 11: SW, S2NW;
Sec. 14: NWNW, NENW, W2SENW, SWNW, NWSW, W2NWSW;
Sec. 15: E2NE, N2SE;
Containing 800 acres more or less.

Note: The lease modification tracts being adjacent combine for 1,721 acres more or less. The combined area of these tracts will be referred to hereafter as the 09MOD.

Location

The 09MOD is located in Gunnison County, Colorado, approximately 10 miles east of the town of Paonia, Colorado, on the south side of state highway 133 and contains approximately 1721 acres. Access to the 09MOD would be through the West Elk mine, which has its portals on a federal lease D-044569 north of the 09MOD and shafts on federal leases COC56447 and COC1362.

Lease Status

COC 57201 - LMU comprised of federal leases; D-044569, COC0117192, COC54558, COC56447, and COC1362. Using the three-year rolling total calculation, it currently meets continued operations requirements to October 1, 2011.

D-044569 - Original and current portal access exists on this lease that, except for chain pillars in the mains, is mined out. The lease is bounded by coal outcrop, and federal leases; therefore, it is not a candidate for modification.

COC0117192 - Is mined out, and is bounded by coal outcrop and fee and federal leases; therefore, it is not a candidate for modification.

COC54558 - Is mined out, and is bounded by coal outcrop, unmineable coal, and federal leases; therefore, it is not a candidate for modification.

COC56447 – Is mined out and borders D-044569 on the east, COC67011 on the west, COC67232 on the north, and C0C1362 on the northeast. Unleased and unmined federal reserves bound it on the southeast, but they are currently unmineable.

COC1362 – Borders D-044567 and COC0117192 on the south, COC56447 on the southwest, COC67232 on the west, and COC54558 on the east. Fee reserves controlled by MCC bound it on the west. Unleased and unmined federal reserves bound it on the south and east and are subject to this modification application. It contains approximately 50 M tons of remaining recoverable reserves of which there are about 2 M tons of B-Seam reserves that may be enhanced by MCC successfully acquiring the 09MOD.

COC67011 – Is mined out and borders D-56447 on the northeast and unleased and unmineable federal coal on the east, south, and north.

COC67232 – Borders COC56447 on the south and COC1362 on the east. Unleased and unmined federal reserves bound it on the south and east and reserves on the south are subject to this modification application. Reserves to the east are considered unmineable. It contains approximately 11 M tons of remaining recoverable reserves of which there are about 4.3 M tons of B-Seam reserves. All its reserves may be enhanced by MCC successfully acquiring the 09MOD.

Stratigraphy & Geology

General - The 09MOD is underlain by the Upper Cretaceous Mesaverde Formation and the Tertiary Wasatch Formation. The Wasatch crops out on Dry Fork Mesa and other high mesas in proximity to the 09MOD.

In this area, the Mesaverde Formation contains five members which are from the top, the Ohio Creek, Barren, Upper Coal, Lower Coal, and the Rollins Sandstone. The Barren Member is approximately 1500 feet thick consisting of interbedded sandstones and shales with a few prominent sandstone beds. This member comprises the majority of the exposed stratigraphy along the drainages on the 09MOD. The coal members range from about 500 to 700 feet thick which has at the base of the Lower Coal Member the Rollins Sandstone underlain by the Mancos Shale. The Upper and Lower Coal Members of the Mesaverde Formation contain the coal beds. The Upper Coal Member contains approximately 220 feet of shales, siltstones, sandstones and three persistent coals recognized as the D, E and F seams. The Lower Coal Member includes about 270 feet of interbedded sandstones, siltstones, shales and three dependable coal seams recognized as the A, B and C seams. The principle potentially mineable coal seam within the 09MOD area is the E seam. Other seams within the 09MOD, A, B, C, D, and F, are considered too thin (less than 8 feet) and discontinuous to mine.

The E-Seam is approximately 280 feet above the Rollins sandstone and consists of upper and lower splits which coalesce on about the northern ¾ of the 09MOD ranging from 15 feet thick on the northwest to 7 feet thick in the

upper split on the south and east. Trends suggest this seam has little if any mineable reserves extending beyond the boundary of the 09MOD.

Within the West Elk Mine workings, both the E and B seams are known to have tectonic fault zones that trend about N65E. The 09MOD is not expected to have fault zones; however, locations and trends of known faults indicate the possibility of similar parallel structural effects in the 09MOD. When faults occur, both methane and water can be present as well as weaknesses due to fractured roof and ribs, any or all of which require mitigation. Methods now used to alleviate methane and/or water flows and/or poor ground conditions are expected to be employed on the 09MOD wherever they become necessary.

Mt. Gunnison, an igneous laccolith, is present to the east and southeast of 09MOD intruding into the sedimentary rock strata. This hard igneous rock has altered and disturbed the sedimentary rocks and intruded the coal layers to an undetermined distance around the mountain effectively establishing the eastern and southeastern limit of mining. Other coal mines in the area have intercepted igneous sills and dikes within the mine works and in some cases these intrusions have proven to be the limiting factor on coal seam mineability.

Coal Quality

The coal in the E-Seam is ranked high-volatile B. The calculated Analysis for clean saleable coal from the seam comes from the drill hole data of seven holes influencing the area of the 09MOD. The analytical data was first isopached then only that data influencing mineable thickness for the seam was included in the averages for the projected saleable reserves. They resulted as follows:

- E Seam Ash 9.54 % Sulphur 0.44% Moisture 12.45% BTU 11,084

This product does meet current contract specifications. Mine production within the E-Seam is expected to encounter a parting resulting in thinner coal as well as dilution during mining on the east and south portions of the 09MOD. This dilution will influence more than half the acreage but would be mitigated by processing the run-of-mine product through a wash-plant.

Mining Factors

Method Constraints

Within the 09MOD geologic constraints relating to coal depth, partings, and thickness, and economic constraints for the applicant dictate that the underground longwall mining method be employed to extract the coal. In addition, more than half the mined tonnage will require beneficiation using a coal wash-plant to render the product saleable. E-Seam overburden ranges from about 800’ to 2,200 feet from NW to SE across the 09MOD but averages 1,200’. These overburden ranges do not pose a constraint to economic recovery. The western boundary of the 09MOD was decided by existing fee coal property and the northern boundary by existing federal leases COC1362 and COC67232. The eastern and southern boundary is dictated by what is projected to be unminable coal in all seams. The 09MOD also fits the remaining available modification acres for the MCC adjacent leases. This overburden necessitates underground mining and since MCC already owns equipment used to develop and mine using the longwall method of mining, they would employ that method to mine the coal reserves. The average mineable thickness for the E-Seam reserve is 10.9 feet.

Production Factors

Current

Short Term Schedule - Production to meet the market demand is supplied by three active development sections operating on 12 hrs/shift, 2shifts/day, 7 days/week schedule (totaling 1070 available shifts/yr.). This schedule is also applied to one longwall face.

Production Data - The current operation develops and longwall mines entirely within the E-Seam north of the 09MOD. MCC successfully mines coal using continuous miners to develop mains of 7 to 10 entries with crosscuts on about 150' centers, and gateroads of 3 entries with crosscuts on about 200' centers. Longwall blocks that are 1,080’ wide and from 8,000' to 15,000' long are then mined on retreat yielding a total of 65% recovery of an average 10.5' thick coal. The mine is currently capable of producing up to 6.5 M tons/year, and maximum annual

production to date was 7.19 M tons which occurred during the 12 month period ending April, 1997. The 12 month production rate ending August 2009 was 5.85 M tons

Mining Equipment - The following is a list of major equipment currently used by MCC and is typical for use in an underground longwall mining operation:

- Continuous Miners 4
- Roof Bolters 4
- Shuttle Cars 10
- Utility Loaders 4
- Lube Truck 1
- Utility Mantrips 6
- Timber Truck 1
- Auxiliary fans 17
- 60" Belt Drives 3
- 72" Belt Drive 10
- Main Mine Fan 3
- Joy Shearer 2
- LW Face Shields 165
- LW Pan Line 2
- Shield Haulers 2

Life of Mine - The recoverable reserves currently available to the operation include about 61 M tons of federal coal and about 10.0 M tons of fee coal which total about 70 M tons and would provide about 11 years of life at the 6.5 M tpy production rate.

Manpower - The current manpower level averages about 350 which includes about 40 contractors at any given time.

Projected with 09MOD

Short Term Schedule - MCC management intends to maintain the current production schedule.

Production Data - The operation would take place within the E-Seam. Panel geometry and recovery would remain the same while management would strive to achieve a 6.5 M tpy production rate. Mining Equipment - There would be no change in the type of equipment although worn equipment would be replaced as needed.

Life of Mine - The 09MOD would add about 1.6 years to the life of the mine at the projected 6.5 M tpy production rate. Actual years of operations on the 09MOD could last over an extended time since coal development would take place before longwall mining with a possible chronological separation in those occurrences. Combined Mine Life for the existing coal properties with the addition of the 09MOD could be from 12 to 15 years. It is likely that the 09MOD itself will be mostly mined-out about 3 years after being entered and that it would be mined beginning in the second half of the Mine Life period.

Manpower - The manpower requirements would remain the same.

Surface Facilities

The current existing and proposed surface coal handling facilities of MCC's West Elk mine located on private land on the north facing slopes of the North Fork River and in Sylvester Gulch would serve the needs of the operation even with additional coal leased as proposed in the 09MOD as applied for by MCC. A coal wash plant was constructed and commissioned during 2010.

Transportation

The current transportation infrastructure at the West Elk mine would serve the mining needs of the operation even with the addition of the 09MOD. There is a conveyor belt system in place from the train load-out silo to the current working area underground. This conveyor system could be extended to working faces in the 09MOD.

Estimated Recovery

The total recovery within the 09MOD should approximate the current recovery of existing mining operations demonstrated to be 65% in the adjacent federal lease. Saleable coal for part of the area is less than the mined tonnage, as discussed above. The layout of the 09MOD captures what is projected to be remaining mineable E-Seam and B-Seam reserves as well as covering some area of projected unmineable reserves for which the exact potential is unknown. It prevents possible bypass of the unknown reserves while allowing a mine layout that increases recovery on existing fee and federal leases. The saleable reserves from the 09MOD as projected should be approximately 10.1M tons according to BLM calculations.

Potential Markets

The current West Elk mine primarily supplies coal for heat energy used in the production of electricity. The approximate breakdown of market destinations for the coal is shown below:

- Electrical Generation 95%
- Other Industrial Use 5%

Maximum Economic Recovery Determination

The 09MOD area MCC applied for was reviewed by BLM and it has been determined that the 09MOD with revisions by BLM is the most efficient and reasonable area to lease, given the current available data from drill holes and the existing mine workings. Although other coal companies have reviewed data on coal deposits in the area, none of them have deemed the unleased resources either substantial or valuable enough for them to initiate new and separate surface and underground facilities.

BLM considers the 09MOD to be non-competitive. These reserves are of good quality but minimal in quantity and essentially locked in by virtue of limited surface access and being bounded by unmineable coal resources. The coal does not outcrop on the 09MOD, therefore no portals could be located, and there would not be a reasonable shaft location.

It has been determined by BLM that Maximum Economic Recovery (MER) of the 09MOD federal lease application can be achieved by underground mining using the longwall method of mining as described above.

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APPENDIX B. UNSUITABILITY ANALYSIS AND REPORT FOR FEDERAL COAL LEASE COC-1362, MODIFICATION 3 & FEDERAL COAL LEASE COC-67232, MODIFICATION 1

Description of the Federal Lands Involved

This unsuitability analysis and report has been prepared to comply with regulations at 43 CFR 3461 for:

COC-1362 lease modification tract:

T. 14 S., R. 90 W., 6th P.M.

Sec. 10: SE, NESW;

Sec. 11: SW, S2NW;

Sec. 14: NWNW, NENW, W2SENW, SWNW, NWSW, W2NWSW;

Sec. 15: E2NE, N2SE;

Containing 800 acres more or less.

and COC-67232 lease modification tract:

T. 14 S., R. 90 W., 6th P.M.

Sec. 11: SWNE,W2SE;SESE

Sec. 14: E2SENW, NE, SE, S2SW, E2NESW;

Sec. 15: SESE;

Sec. 22: E2NE;

Sec. 23: NW, NWNE;

Containing 921 acres more or less.

This lease modification application was brought forward by Mountain Coal Company (MCC) to ensure that compliant and super-compliant coal resources are recovered and not bypassed. The two lease modifications, collectively referred to in this report as the Sunset lease modifications, lie immediately south, and are contiguous with existing federal coal leases COC-1362 and COC-67232. The coal in these modifications would be accessed and recovered by underground longwall mining methods from MCCs existing West Elk Mine. The surface of the lease modification is National Forest System (NFS) lands administered by the Grand Mesa-Uncompahgre-Gunnison National Forests (GMUG). The mineral estate is federally owned and is administered by the BLM-Uncompahgre Field Office.

As a first step in this analysis, the preliminary mining plan submitted by the applicant was examined in order to identify areas in which the proposed underground mining operation would produce surface effects, including where the zone of influence from subsidence may extend beyond the lease modification boundaries. Areas identified as likely to be affected by subsidence were delineated as having surface effects. For this lease modification the zone of influence was assessed to be the modification area as well as the area identified in the project file for being within the angle of draw for subsidence.

This analysis and report was prepared consistent with the unsuitability criteria published in 43 CFR 3461. The unsuitability criteria were applied individually to the area being considered, and areas identified as having surface effects as applicable. Each criterion was applied individually, then after all criteria had been applied, the exemptions of each criterion found to be applicable were then examined; thirdly a determination was made if the exceptions to each criterion were applicable. Exceptions to certain criteria allow areas to be considered further even though they have been determined to be unsuitable. These exceptions to the criteria are noted where applied.

Analysis of the Unsuitability Criteria

The analysis examined the applicability of exemptions and exceptions to the criteria as detailed in regulation. Exemptions to the criteria are not described, as no exemptions were determined to apply. Exceptions to the criteria are described only if they apply.

Criterion 1

All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forests, and federal lands in incorporated cities, towns, and villages.

1. Exceptions.(i) A lease may be issued within the boundaries of any National Forest if the Secretary finds no significant recreational, timber, economic or other values which may be incompatible with the lease; and (A) surface operations and impacts are incident to an underground coal mine, or (B) where the Secretary of Agriculture determines, with respect to lands which do not have significant forest cover within those National Forests west of the Meridian, that surface mining may be in compliance with the Multiple-Use Sustained-Yield Act of 1960, the Federal Coal Leasing Amendments Act of 1976 and the Surface Mining Control and Reclamation Act of 1977.

Analysis

The lands described in the Sunset lease modifications were proclaimed National Forest on June 5, 1905 and are within the Gunnison National Forest. Management direction for coal resources are listed in the Amended Land and Resource Management Plan (LRMP), Grand Mesa, Uncompahgre and Gunnison National Forests - General Direction on pages III-62 through III-70.

The LRMP allows for multiple use management on the lands in the lease modification, which are principally managed for wildlife habitat, however management includes livestock grazing, motorized recreation and vegetation treatment. The LRMP does not identify that any significant recreational, timber, economic or other values which may be incompatible with the lease are present. No significant forest cover is present.

In addition, foreseeable surface operations and impacts will be incident to an underground coal mine. Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 2

Federal lands that are within rights-of-way or easements or within surface leases for residential, commercial, industrial, or other public purposes, on federally-owned surface shall be considered unsuitable.

1. Exceptions. A lease may be issued, and mining operations approved, in such areas if the surface management agency determines that (i) all or certain types of coal development (e.g., underground mining) will not interfere with the purpose of the right-of-way or easement, or (ii) the right-of-way or easement was granted for mining purposes, or (iii) the right-of-way or easement was issued for a purpose for which it is not being used, or (iv) the parties involved in the right-of-way or easement agree, in writing, to leasing, or (v) it is impractical to exclude such areas due to the location of coal and method of mining and such areas or uses can be protected through appropriate stipulations.

Analysis

There is a General Land Office Order, 10/31/1973, which classifies the lands within the application area for coal. The lands are also within the Paonia-Somerset Known Recoverable Resource Area, COC-20093. There are no known rights-of-way, easements or surface leases for residential, commercial, industrial, or other public purposes within the review area.

Criterion 3

Federal lands affected by section 522(e)(4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the right-of-way of a

public road, or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park, or within 300 feet of an occupied dwelling.

1. Exceptions. A lease may be issued for lands (i) used as mine access roads or haulage roads that join the right-of-way for a public road, (ii) for which the Office of Surface Mining Reclamation and Enforcement has issued a permit to have public roads relocated,(iii) if, after public notice and opportunity for public hearing in the locality, a written finding is made by the Authorized Officer that the interests of the public and the landowners affected by mining within 100 feet of a public road will be protected, or (iv) for which owners of occupied dwellings have given written permission to mine within 300 feet of their buildings.

Analysis

No public roads, cemeteries, occupied dwellings, public buildings, schools, churches, community, or institutional buildings exist within this area.

Criterion 4

Federal lands designated as wilderness study areas shall be considered unsuitable while under review by the Administration and Congress for possible wilderness designation. For any federal land which is to be leased or mined prior to completion of the wilderness inventory by the surface management agency, the environmental assessment or impact statement on the lease sale or mine plan shall consider whether the land possesses the characteristics of a wilderness study area. If the finding is affirmative, the land shall be considered unsuitable, unless issuance of noncompetitive coal leases and mining on leases is authorized under the Wilderness Act and the Federal Land Policy and Management Act of 1976.

Analysis

No lands within the review area are designated Wilderness Study Areas. The current LRMP manages these lands for multiple uses (see Criterion 1). Wilderness characteristics for these lands were evaluated by the GMUG in 2005. This area was determined to be not available for wilderness due to mineral values. Additionally, boundary management of the area would be difficult.

Criterion 5

Scenic federal lands designated by visual resource management analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable. A lease may be issued if the surface management agency determines that surface coal mining operations will not significantly diminish or adversely affect the scenic quality of the designated area.

Analysis

No lands within the review area are designated as visual resource management Class I areas.

Criterion 6

Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study, demonstration, or experiment except where mining could be conducted in such a way as to enhance or not jeopardize the purposes of the study, as determined by the surface management agency, or where the principal scientific use or agency give written concurrence to all or certain methods of mining.

Analysis

No lands within the review area are under permit for scientific study.

Criterion 7

All publicly-owned places on federal lands which are included in the National Register of Historic Places shall be considered unsuitable. This shall include any areas that the surface management agency determines, after consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Officer, are necessary to protect the inherent values of the property that made it eligible for listing in the National Register.

Analysis

No publicly-owned places on federal or fee lands within the review area are included in the National Register of Historic Places.

Criterion 8

Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable.

Analysis

No lands within the review area are designated as natural areas or as National Natural Landmarks.

Criterion 9

Federally designated critical habitat for listed threatened or endangered plant and animal species, and habitat proposed to be designated as critical for listed threatened or endangered plant and animal species or species proposed for listing, and habitat for Federal threatened or endangered species which is determined by the Fish and Wildlife Service (Service) and the surface management agency to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable.

1. Exceptions. A lease may be issued and mining operations approved if, after consultation with the Fish and Wildlife Service, the Service determines that the proposed activity is not likely to jeopardize the continued existence of the listed species and/or its critical habitat.

Analysis

No lands within the review area are designated as critical habitat, proposed to be designated as critical habitat, or determined to be essential habitat for any federally listed threatened or endangered plant or animal species, or species proposed for listing (Federal Register, various dates).

A Forest species list was provided by the US Fish and Wildlife Service on 9 May 2008 (USDI 2008b). There is only one federally listed terrestrial species that has the potential to be found in the project area, the Canada lynx. Other species considered are shown in Table 1. As these species do not occur in the project area and no habitat for them will be impacted by the project, these species were not further analyzed. These species would all have no effect determinations. Fish species are being analyzed separately.

Table 1. Federally Threatened and Endangered or Candidate Species considered for this project.

Species	*Scientific Name*	*Habitat Description and Requirements*	*Habitat in Project Area?*
Canada Lynx	*Lynx canadensis*	*Spruce/fir, mixed conifer, lodgepole pine forest (primary), or mixed deciduous/conifer (secondary).*	*Yes*
Mexican spotted owl	*Strix occidentalis lucida*	*Desert canyons, ponderosa forests. Not known or expected to occur on the Paonia RD.*	*No*
Uncompahgre fritillary butterfly	*Boloria acrocnema*	*Above treeline, closely associated with larval host, snow willow. Not known or expected to occur on the Paonia RD.*	*No*
Debeque Phacelia (candidate)	*Phacelia submutica*	*Specific clay-based soils of the Wasatch Formation in Piceance Basin, CO. Not known or expected to occur on the Paonia RD*	*No*

Species	*Scientific Name*	*Habitat Description and Requirements*	*Habitat in Project Area?*
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	*Coarse rocky soils above the current flood plains of the Colorado, Gunnison, and Green River drainages in western Colorado and northeastern Utah. Not known or expected to occur on the Paonia RD.*	*No*

The Canada Lynx was listed as threatened in March 2000. In August 2004, the Second Edition of the Canada Lynx Conservation Assessment and Strategy (LCAS) was released, to provide a consistent and effective approach to conserve Canada lynx on federal lands. The Canada Lynx Conservation Agreement (USDA 2005) identifies the Science Report (Ruggiero et al. 2000) and the LCAS (Ruediger et al. 2000) as including the best available science on habitat and conservation measures. Both of these documents, along with local information were to be used for project analyses.

Following release of the LCAS, the Forest mapped lynx analysis units (LAUs) and habitat within them, based on Regional direction. Habitat was mapped based on existing vegetation information, including vegetation type, canopy closure and size of trees. Areas outside of LAUs are not considered to be lynx habitat even though they may contain habitat components or stands similar to those within LAUs. The GMUG Forest Plan includes direction about limiting the amount of currently unsuitable habitat within a LAU to less than 30%. Currently, 0.5% of lynx habitat within the LAU is unsuitable. The project is within the Mount Gunnison LAU, and potential impacts of the project to lynx are limited to that LAU. Existing conditions of the Mount Gunnison LAU are displayed in Table 4.

Implementation of the project **"may affect, but is not likely to adversely affect**" the Canada lynx. The "may affect" is based primarily on the loss of suitable habitat in the project. Other impacts such as disturbance during denning or increased mortality risk are insignificant and discountable due to the distance of the project from typical Colorado denning habitat, and the low probability of loss of lynx from traffic or incidental shooting as a result of this project.

Implementation of the project **may affect, and is likely to adversely affect**, the bonytail, Colorado pikeminnow, the humpback chub, and the razorback sucker, due to the cumulative nature of water depletions associated with this and other activities in the area. Critical habitat for the Colorado–pikeminnow, razorback sucker, humpback chub, and bonytail chub does exist off-site in the lower Gunnison River, and in the Colorado River. This critical habitat could be affected by water depletion from this action (Federal Register/Vol. 59, No. 54). This project **may affect, and is likely to adversely affect**, designated critical habitat for these species downstream of this project.

Water depletion associated with this project would be consistent with the programmatic document developed for small water depletions (< 100 acre-feet per year) associated with numerous mineral development projects located on the GMUG NF (USFWS May 25, 2005, amended April 27, 2007 - #ES/GJ-6_CO-99-F-033-CP062). At the post-leasing (permitting) stage, prior to the approval of the mine plan, if it is determined that development of the lease would result in a change in water use resulting in a surface water depletion in the upper Colorado River Basin that exceeds the quantity covered in the existing programmatic opinion, the permitting agency must enter into consultation with the U.S. Fish and Wildlife Service to determine the appropriate conservation measures to offset the effect to these listed fishes.

Therefore for reasons stated above, the exception can apply to this criterion.

Criterion 10

Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as endangered or threatened shall be considered unsuitable.

1. Exceptions. A lease may be issued and mining operations approved if, after consultation with the state, the surface management agency determines that the species will not be adversely affected by all or certain stipulated methods of coal mining.

Analysis

There is habitat within the lease modification area for the Canada Lynx.

Implementation of the project **"may affect, but is not likely to adversely affect**" the Canada lynx. The "may affect" is based primarily on the loss of suitable habitat in the project. Other impacts such as disturbance during denning or increased mortality risk are insignificant and discountable due to the distance of the project from typical Colorado denning habitat, and the low probability of loss of lynx from traffic or incidental shooting as a result of this project.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 11

A bald or golden eagle nest site on federal lands that is determined to be active, and an appropriate buffer zone of land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the Fish and Wildlife Service.

1. Exceptions. A lease may be issued if (1) it can be conditioned in such a way, either in manner or period of operation, that eagles will not be disturbed during the breeding season, or (2) the surface management agency, with the concurrence of the Fish and Wildlife Service, determines that the golden eagle nest(s) will be moved, or (3) buffer zones may be decreased if the surface management agency determines that the active eagle nests will not be adversely affected.

Analysis

There are no known golden eagle or bald eagle nests in or near the Sunset lease modifications. Due to the distance of the area from suitable foraging habitat (the North Fork Gunnison) it is unlikely that bald eagles nest in this area.

Underground coal mining and nesting bald or golden eagles are compatible on the same tract of land unless surface facilities or surface disturbances cause nest-site abandonment. Present guidelines used by the CDOW are:

Golden Eagle:

No surface occupancy beyond historic levels within ¼ mile radius of active golden eagle nests. (CDOW 2008)
Seasonal restriction to human encroachment within ½ mile radius of active nests from December 15 through July 15. (CDOW 2008)

Any proposed surface facilities, disturbances or activities (as noted above) in or adjacent to these buffer zones will require approval from the surface management agency (BLM or USFS) on a site-specific basis, after consultation with the Fish and Wildlife Service.

Stipulations on the existing lease, which will apply to the modification area, are consistent and/or more restrictive than the current DOW language.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 12

Bald and golden eagle roost and concentration areas on federal lands used during migration and wintering shall be considered unsuitable.

Analysis

No bald or golden eagle roost sites or concentrations areas are known to exist on federal lands within the review area.

Criterion 13

Federal lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and buffer zone of federal land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species

and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the Fish and Wildlife Service.

1. Exception. A lease may be issued where the surface management agency, after consultation with the Fish and Wildlife Service, determines that all or certain stipulated methods of coal mining will not adversely affect the falcon habitat during the periods when such habitat is used by the falcons.

Analysis

There are no known peregrine or prairie falcon nest sites in the lease modification area. No known suitable nesting cliffs exist in the area. In addition, lease stipulations on the parent lease require raptor surveys:

Conduct surveys for nesting raptors on the lease tract prior to development of any surface facilities. No surface activities will be allowed within ½ mile rates of active nest sites between the dates of February 1 and August 15, unless authorized by the BLM or USFS on a site specific basis.

These stipulations will apply to the lease modification area.

Implementation of the proposed action "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing". This is based on the presence of potential nest locations in or near the project area, and the low potential for disturbance as a result of pre-disturbance surveys and implementation of conditions for surface use if needed. As similar sites exist throughout the North Fork Valley, and this species is not known to use this area, the potential for harmful effects at the population level is anticipated to be low.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 14

Federal lands which are high priority habitat for migratory bird species of high federal interest on a regional or national basis, as determined jointly by the surface management agency and the Fish and Wildlife Service, shall be considered unsuitable.

1. Exception. A lease may be issued where the surface management agency, after consultation with the Fish and Wildlife Service, determines that all or certain stipulated methods of coal mining will not adversely affect the migratory bird habitat during the periods when such habitat is used by the species.

Analysis

Of the 278 breeding bird species in Colorado, 65 priority species in 15 major habitats and three physiographic areas are addressed in the Colorado Bird Conservation Plan. The project area is within the Southern Rocky Mountains Physiographic Province (62), and several priority habitats are present within or immediately adjacent to the lease modification area. These habitats and associated high priority species include:

- Aspen: broad-tailed hummingbird, red-naped sapsucker, purple martin, violet-green swallow;
- Cliff/Rock: peregrine falcon, black swift;
- High elevation riparian: Cordilleran flycatcher, American dipper, McGillivray's warbler, Wilson's warbler;
- Low elevation riparian: Lewis' woodpecker, lazuli bunting;
- Mixed conifer: blue (currently dusky) grouse, Williamson's sapsucker;
- Mountain shrubland: Virginia's warbler, green-tailed towhee;
- Spruce-fir: boreal owl, olive-sided flycatcher, Hammond's flycatcher.

Many of these species are known or suspected to be present in the project area. In addition, the flammulated owl is listed as a ponderosa pine species in the plan. However, it is known to use aspen in this area. Implementation of the proposed action "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing".

Stipulations on the parent lease, which will apply to the lease modification, require avoidance of certain habitats of breeding and neotropical birds:

> If there is reason to believe that new individuals or populations of Threatened or Endangered, or Sensitive Species or plants or animals, or migratory bird species of high federal interest occur in the area, the lessee shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 15

Federal lands which the surface management agency and the state jointly agree are habitat for resident species of fish, wildlife and plants of high interest to the state and which are essential for maintaining these priority wildlife and plant species shall be considered unsuitable. Examples of such lands which serve a critical function for the species involved include: (i) active dancing and strutting grounds for sage grouse, sharp-tailed grouse, and prairie chicken, (ii) winter ranges crucial for deer, antelope, and elk, (iii) migration corridor for elk, and (iv) extremes of range for plant species.

1. Exception. A lease may be issued if, after consultation with the state, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

Analysis

There are no known habitats for sage grouse, sharp-tailed grouse, or prairie chickens in this area. The area does not contain winter range for deer and elk. Elk do migrate through this area from higher elevations to winter range in the valley, but it is not delineated as a corridor by CDOW. This area may be at the extreme range for plant species but there are no known populations of threatened, endangered, or Forest Service Sensitive plants in this area. Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 16

Federal lands in riverine, coastal, and special floodplains (100-year recurrence interval) on which the surface management agency determines that mining could not be undertaken without substantial threat of loss of life or property shall be considered unsuitable for all or certain stipulated methods of coal mining.

Analysis

The application lands are not within a riverine, coastal or special floodplain.

Criterion 17

Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable.

Analysis

None of the lands in the proposed lease tract are within a municipal watershed.

Criterion 18

Federal lands with National Resource Waters, as identified by states in their water quality management plans, and a buffer zone of federal lands ¼-mile from the outer edge of the far banks of the water, shall be unsuitable.

Analysis

None of the lands in the proposed lease tract are identified as a National Resource Water.

Criterion 19

Federal lands identified by the surface management agency, in consultation with the state in which they are located, as alluvial valley floors according to the definition in Subpart 3400.0-5(a) of this title, the standards of 30

CFR Part 822, the final alluvial floor guidelines of the Office of Surface Mining Reclamation and Enforcement when published, and approved state programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable. Additionally, when mining federal land outside an alluvial valley floor would materially damage the quantity or quality of water in surface or underground water systems that would supply alluvial valley floors, the land shall be considered unsuitable.

Analysis

The application lands are not within an alluvial valley floor, but such lands drain into the North Fork Gunnison River, along which, both surface irrigated and potentially irrigable sites exist. Within the lease modification boundaries, no known water facilities (reservoirs, ditches, diversions) exist.

Changes in ground slope and creation of tension cracks can alter surface hydrology and soil erosion processes. Increased surface erosion, debris flows and disruption of drainage pattern and flow in streams have been documented (Sidle, et al. 2000). Effects to stream channels include (1) increase in lengths of cascades and to a lesser extent glides; (2) increases in pool length, numbers and volumes; (3) increase in median particle diameter of bed sediment in pools; and (4) some constriction in channel geometry. The magnitude of these effects varies depending upon the amount and location of subsidence.

Increased sediment delivery could affect water quality in nearby creeks (e.g. increased sediment load). Although no perennial drainages exist within the modification area, intermittent and ephemeral drainages do receive nominal amounts of sediment from the soils and existing instability of slopes in the area. Increase sedimentation occurs during normal precipitation and spring runoff, so effects of increased sedimentation may not be quantifiable beyond baseline levels.

Increased surface erosion, changes to drainage morphology and possible disruption of seasonal stream-flow could occur as a result. Since subsidence is not expected in the vicinity of floodplains or major stream channels, disruptions of stream flow as a low probably of occurrence. The magnitude and duration of predicted effects depends upon the amount and location of subsidence.

Although material damage to the quality and quantity water arising on or flowing over the proposed Sunset lease modifications is possible, because of the reason listed above, this is not anticipated, and would be hard to separate from natural process that are currently affecting water quality/quantity.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 20

Federal lands in a state to which is applicable a criterion (i) proposed by the state or Indian tribe located in the planning area, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable.

Analysis

This criterion is not presently in effect in the State of Colorado.

References

Colorado Division of Wildlife GIS data http://ndis.nrel.colostate.edu/ftp/index.html

Partners in Flight 2000. Landbird Conservation Plan Colorado. Estes Park, CO. Available http://www.blm.gov/wildlife/plan/pl-co-10.pdf

Pfister, Allan R. (USFWS Grand Junction Office) 2007. Programmatic Biological Opinion for Water Depletions on the GMUG National Forest. May 25, 2005, amended April 27, 2007 - #ES/GJ-6_CO-99-F-033-CP062.

Ruediger, Bill, et.al. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, Montana.

U.S. Department of The Interior, 1983, Uinta-Southwestern Utah Coal Region Environmental Impact Statement, U. S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, Utah.

U.S. Fish and Wildlife Service, 2008. Western Colorado Suboffice, Grand Junction, CO. Updated Species List.

Other references in the Biological Assessment and Biological Evaluation for the project.

Consultation and Coordination

The following agencies and organizations were contacted to gain information pertinent to the application of the 20 coal suitability criteria:

Federal Agencies

U.S. Department of Interior
Fish and Wildlife Service
Western Colorado Suboffice
529 25 1/2 Road
Grand Junction, CO 81505-6199

Colorado State Agencies

Division of Wildlife, Southwest Region Office, Gunnison, CO.

APPENDIX C. ROLES AND RESPONSIBILITIES OF REGULATORY AGENCIES IN THE FEDERAL COAL PROGRAM IN COLORADO

Analysis and permitting of federal coal resources occurs in many phases, by many different regulating entities. This section is intended to briefly describe the roles and responsibilities of the primary agencies responsible for analyzing and authorizing the various phases of coal development on Federal lands in the State of Colorado. This section is not meant to describe every permitting step, every situation or scenario; only to provide the reader with a general understanding of the complex regulatory environment of the federal coal program. Each section below is broken down into a list of primary authorities that apply to each phase, as well as a brief description of roles and responsibilities.

Exploration

Authorities

Mining and Minerals Policy Act of 1970; Federal Land Policy and Management Act of 1976 (FLPMA); Forest Service Manual 2800; 43 CFR 3400; and the Energy Policy Act of 2005; Surface Mining Control and Reclamation Act of 1977 (SMCRA), 30CFR 740.4(e), Colorado Surface Coal Mining Reclamation Act (CRS 34-33-101), 30 CFR Part 906, Appendix B;

Roles

Exploration for coal on Federal mineral estate may occur prior to issuance of a lease through an exploration license (43 CFR 3410) issued by the BLM. Exploration after leasing, but prior to the issuance of a mining permit, is also authorized by the BLM (43 CFR 3480). After lands are leased and mining permit has been issued, exploration activities are permitting through the Office of Surface Mining, via the Colorado Division of Reclamation, Mining, and Safety (DRMS).

On federal lands, the BLM is the primary agency responsible for analyzing (NEPA) and authorizing exploration licenses. If NFS lands are involved, as the surface management agency, the USFS is required to provide conditions for surface use (43 CFR 3410.2-3), for the BLM include as requirements to the exploration license, if approved. Exploration licenses are issued for a term of two years; after that term ends the license expires, they cannot be extended.

If exploration is proposed after leasing has occurred, and the area proposed for exploration is within a mine permit boundary, then the primary authorizing agency is the DRMS. In Colorado, the Division of Reclamation Mining and Safety (DRMS) operates under an OSM -approved program for administering coal mining operations in the state, codified by the Colorado Surface Coal Mining Reclamation Act (CRS 34-33-101) and attendant regulations which are consistent with the overarching federal regulations (30 CFR Part 906, Appendix B).

Proposals for exploration on federal land under permit, the BLM and/or the USFS, as the federal land management agency (FLMA), reviews an applicant's submittal to ensure that it provides for post-mining land use consistent with the land use plan and has adequate protections for Federal resources.

Leasing

Authorities

Mineral Leasing Act of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976; Mining and Minerals Policy Act of 1970; Federal Land Policy and Management Act of 1976 (FLPMA); Forest Service Manual 2800; 43 CFR 3400; and the Energy Policy Act of 2005.

Roles

In order for a mining company to access federal coal reserves, the company must apply to lease those Federal lands for development of the coal resource. An application is submitted to the BLM who administers the Federal mineral estate on all Federal lands. BLM initiates the lease consideration process, which ensures that a NEPA

analysis is completed. Following 43 CFR 3461, the BLM (or the USFS if on NFS lands) must insure that the assessment of coal unsuitability criteria has been completed for the lands proposed for leasing.

When on NFS lands, the Forest Service has consent authority to the BLM for leasing NFS lands for coal resource development; in addition, as the surface management agency, it prescribes stipulations for the protection of non-mineral resources, and confirms conformance with land use plans. Where National Forest System lands are involved, the BLM and Forest Service jointly manage the leasing process according to the authorities granted in these laws, and implementing regulations at 43 CFR 3400.

At the leasing stage, for underground coal operations the federal agencies evaluate the effects of subsidence (i.e. the land surface lowered as a result of mining) on surface resources, and identify where surface resources may require specific protection from subsidence or other foreseeable surface impacts. Under a foreseeable mine plan scenario, surface uses on these modifications may include, exploration, methane drainage wells, and associated access roads required to safely mine the coal resources. Specific locations of disturbances and roads are not known at the leasing stage, and will not be known until the time specific mine plans are approved by the State, BLM, MSHA and the federal Office of Surface Mining during the subsequent permitting process (see below). However, in all alternatives that allow for surface use, this use is reasonably projected for cumulative effects analysis purposes in the NEPA at the leasing stage.

If the decision is given to lease the lands in question, then they are subsequently sold, at auction by the BLM to the highest bidder. The BLM retains principal responsibility for enforcing lease terms and conditions.

Under 43 CFR 3432 (as amended by the Energy Policy Act of 2005), the holder of a federal coal lease may apply to non-competitively modify a lease by adding up to 960 contiguous acres. The BLM may modify the lease to include all or part of the lands applied for if (43 CFR 3432.2(a)):

1. The modification serves the interests of the United States;
2. There is no competitive interest in the lands or deposits; and the additional lands or deposits cannot be developed as part of another potential or existing independent operation.
3. The additional lands or deposits cannot be developed as part of another potential or existing independent operation.

The terms and conditions of the original lease shall be made consistent with the laws, regulations, and lease terms applicable at the time of modification (43 CFR 3432.3(a)). For coal lease modifications involving National Forest System lands, the BLM will submit the application to the Secretary of Agriculture for consent, completion of a NEPA analysis, and attachment of appropriate lease stipulations (43 CFR 3432.2(d)).

Permitting/Operations

Authorities

Surface Mining Control and Reclamation Act of 1977 (SMCRA), 30CFR 740.4(e), Colorado Surface Coal Mining Reclamation Act (CRS 34-33-101), 30 CFR Part 906, Appendix B; Mineral Leasing Act of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976; Mining and Minerals Policy Act of 1970; Federal Land Policy and Management Act of 1976 (FLPMA); Forest Service Manual 2800; 43 CFR 3400;

Roles

Actual mining and associated surface uses on federal coal leases are governed by the Surface Mining Control and Reclamation Act of 1977 (SMCRA), a portion of the Mineral Leasing Act, as well as other laws and regulations, which establishes requirements for planning, permitting, and monitoring compliance with specific operations, and reclamation requirements for surface disturbance associated with surface and underground coal mining operations. Implementation of SMCRA is the responsibility of the USDI-Office of Surface Mining Reclamation and Enforcement (OSM) according to implementing regulations at Title 30 CFR Chapter VII, Parts 816 and 817. The law and regulations establish that administering coal mining operations are done principally at the state level, with oversight from the OSM. The law and regulations also establish the roles and responsibilities of federal agencies other than the OSM (such as the FS and BLM) whose lands may be involved in coal mining operations.

In Colorado, the Division of Reclamation Mining and Safety (DRMS) operates under an OSM -approved program for administering coal mining operations in the state codified by the Colorado Surface Coal Mining Reclamation

Act (CRS 34-33-101) and attendant regulations which are consistent with the overarching federal regulations (30 CFR Part 906, Appendix B). Federal coal leaseholders in Colorado must hold a State-approved mining permit before performing mining and reclamation operations on Federal lands in the state. Colorado's approved federal coal program procedures include at all points in the mine permitting process, a role for the federal land management agency (FLMA) to review an applicant's submittal to ensure that it provides for post-mining land use consistent with the land use plan and has adequate protections for Federal resources.

The DRMS administers and enforces performance standards and permit requirements during the period of mine operation, reclamation, and an extended reclamation liability period, and has primary authority in environmental emergencies. The DRMS is the agency with principal authority to approve all coal mining permits and related activities, even if those activities occur on federal land.

In addition to the mine permitting process, it would also be the jurisdiction of the DRMS to insure that the following items are up to date, and in line with law, regulation, and policy, and follow the guidelines of the FLMA: 1) Spill Prevention, Control, and Countermeasure plan; 2) Herbicide Use and Weed Control Plan; 3) revision or modification of Air Permits (e.g. CDPHEs determination / applicability of EPA's Tailoring Rule).

Additional Permits Required

In addition to the mine permit process, other permitting processes not covered by DRMS authority may need to be analyzed (NEPA) and permitted by the FLMA. Examples of these types of permits include: 1) Road Use Permits; 2) Timber contract for removal of merchantable timber; and 3) Special Use/Right-of-Way Authorizations for other surface disturbing activities not covered by the mine permit (e.g. pipelines and off-lease facilities for methane mitigation).

MCC will be required to obtain/update additional information specific to this leasing action including:

- Update Forest Service Road Use Permit
- Forest Service timber contract for any merchantable timber removed
- Update Approved Pesticide Use and Weed Control Plan
- Mine permitting with DRMS

Other permits currently held by MCC such as NPDES, SPCC, 404 Permits, Air Construction Permit, etc. remain valid until renewal is necessary.

Other

The implementing Federal and State regulations give the Surface land Management Agency (i.e. the BLM or Forest Service) responsibility to review coal mine permit applications and revisions to them to determine the post-mining use of the land, protection of non-mineral resources, require appropriate conditions to regulate surface use and reclamation (30CFR 740.4(e)). In certain cases, coal mine permit actions require specific approval from the USDI via the OSM.

With respect to compliance with the National Environmental Policy Act (NEPA) for analyzing and authorizing activities under mine permits, under 30 CFR § 906.30 Appendix B, it is the responsibility of OSM to determine the need for an EA or an EIS, pursuant to NEPA. It is also their responsibility to prepare an analysis in compliance with NEPA, and CEQ regulations.

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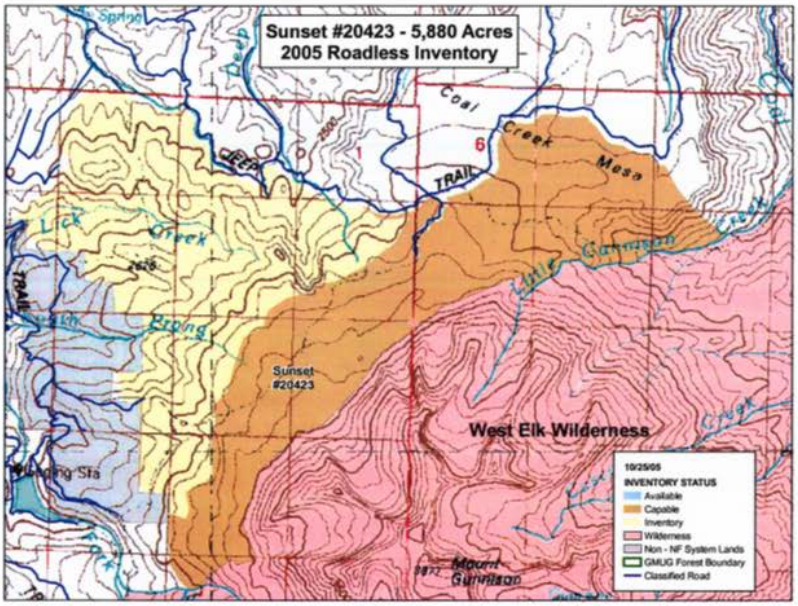
APPENDIX D. SUNSET ROADLESS EVALUATION

Sunset #20423 – 5,880 Acres – Gunnison County

General Description: The Sunset unit is located approximately nine miles east of Paonia. The area is north and contiguous to the West Elk Wilderness and is bounded by private land in-holdings to the west and roads to the north. It is separated from the Flatirons Unit #20424 by Road #711, Dry Fork of Minnesota Creek Road.



Elevation Range – 6,300' – 12,000'

Eco-Section – M33IH – Northern-Central Highlands and Rocky Mountain

Vegetation – The Potential Natural Vegetation is predominately 6% Douglas-fir, 16% spruce-fir, 36% spruce-fir-aspen, 9% aspen, 18% shrub, and 7% bare ground.

Land Type –

52% 50IH – Montane climate zone; interbedded sandstone and shale geology.

24% 30IH – Lower Montane climate zone; interbedded sandstone and shale geology.

14% 60IH – Montane and Subalpine climate zone; interbedded sandstone and shale geology.

Resource Activities:

Current & Ongoing:

- The Dry Fork cattle allotment is within this unit and is currently vacant.
- Although the area was outside the area of analysis and not made available for oil and gas lease, there area currently has oil and gas leases pending.
- Application for coal exploration license.

Wilderness Potential:

Capability:

Environment –

- Naturalness – The lands directly adjacent to the Wilderness boundary offer a high degree of naturalness
- Solitude – Opportunities for remoteness and solitude are present in the vicinity of the wilderness boundary.

Challenge – The area offers a moderate-high degree of challenge. The terrain is rugged; however, proximity to trails and roads diminishes opportunities of self-reliance and adventure.

Manageability/Boundaries –

- Size/Shape – The area is small, yet adjoins the West Elk Wilderness.
- Boundaries – The boundary would be more difficult to identify and manage than the existing boundary. The existing boundary follows the slope of the mountain and is highly defensible. Moving the boundary would not improve management of the wilderness.

Special Features/Activities – The Deep Creek Slide area exhibits a striking geologic feature.

Evaluation: The portion of the unit immediately adjacent to the wilderness retains the roadless qualities that make it **capable** of wilderness.

Availability (of Capable Lands):

Recreation – The area is heavily used during hunting season.

Water – No known water facilities.

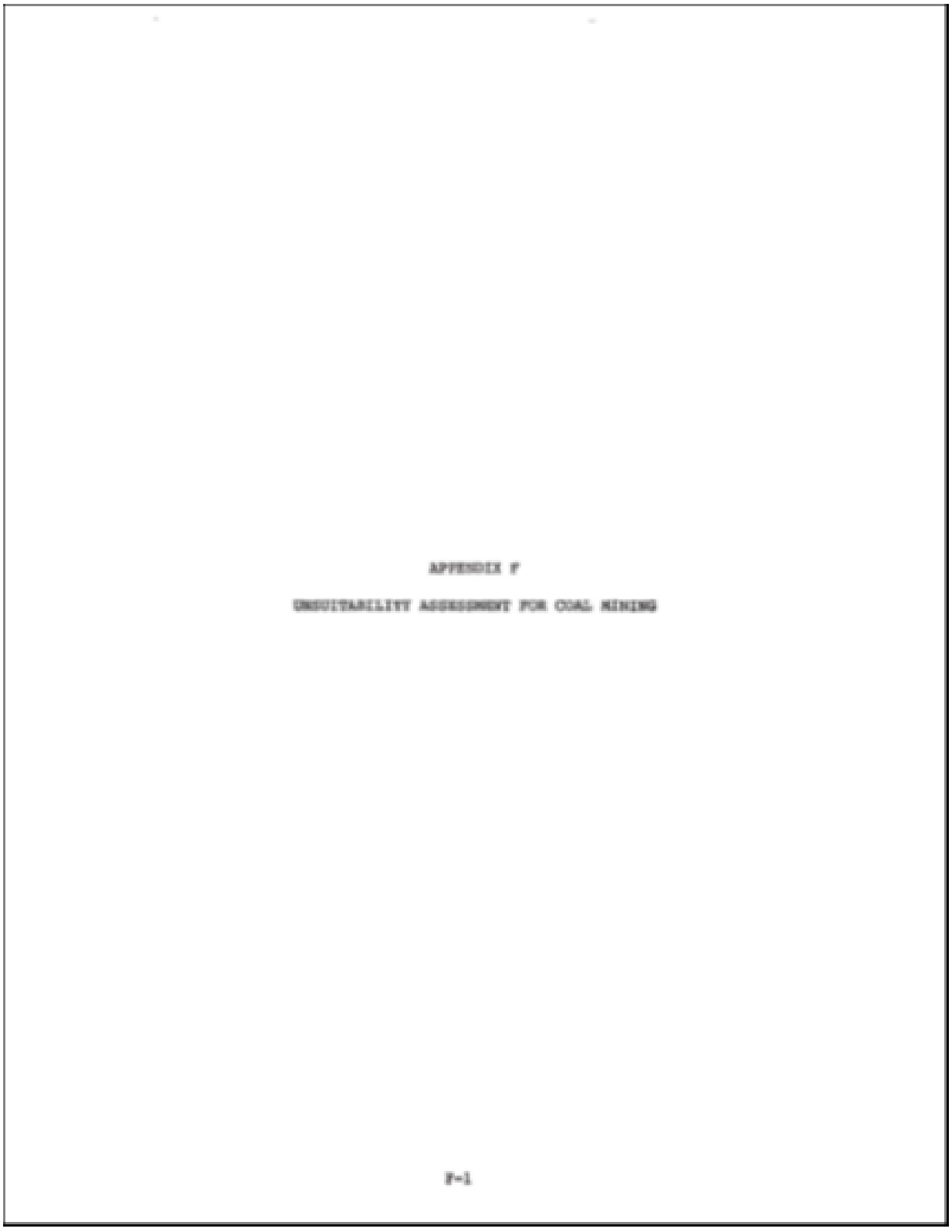
Timber – There are approximately 1,500 acres within the capable portion that are tentatively suitable for producing timber for wood fiber production. Another 100 acres of suitable timber land are within the inventory portion.

Minerals – Under the 2004 RFD, the area was identified as high potential for oil and gas. There is currently an application for coal exploration license.

Management Considerations – Boundary management would not be improved; the existing boundary is highly defensible.

Evaluation – The capable lands are **not available** for wilderness due to mineral values. Additionally, boundary management of the area would be difficult.

APPENDIX E. FOREST PLAN UNSUITABILITY ASSESSMENT



APPENDIX F

UNSUITABILITY ASSESSMENT FOR COAL MINING

F-1

UNSUITABILITY ASSESSMENT FOR COAL MINING

National Forest System land was analyzed for unsuitability if it is within a Known Recoverable Coal Resource Area as defined by the United States Geological Survey and delineated as Known Coal Resource Leasing Area on Colorado Geological Survey Map Series 9, or if it is already leased for coal production as in the Huntsman Ridge area.

CRITERION NUMBER 1

"All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forest, and Federal lands in incorporated cities, towns and villages."

National Forests are unsuitable for coal mining.

EXCEPTIONS

National Forest System land with no significant recreational, timber, economic, or other values are suitable for underground mining.

National Forest System land with significant recreational, timber, economic, or other values which are compatible with underground mining are suitable for underground mining.

CONCLUSION

The West Elk and Raggeds Wildernesses are unsuitable for coal mining. The rest of the Known Recoverable Coal Resource Area is suitable for coal mining if other criteria do not apply or if exceptions to applicable criteria are used.

CRITERION NUMBER 2

"Federal lands that are within rights-of-way or easements or within surface leases for residential, commercial, industrial, or other public purposes, or for agricultural crop production on Federally owned surface shall be considered unsuitable."

This is interpreted under Forest Service regulations to mean, "Federal land with rights-of-way or easements or under special use permits for residential, commercial, industrial, or agricultural purposes shall be considered unsuitable."

EXCEPTIONS

A lease (or special use permit) may be issued and mining operations approved if the Forest Service determines that it is impractical to exclude such areas due to the location of coal and method of mining and such areas can be protected through appropriate stipulations.

F-2

CONCLUSION

All areas to which criterion number 2 apply are excepted because it is impractical to exclude these areas from underground coal mining and because such areas can be adequately protected with operating plan stipulations.

CRITERION NUMBER 3

"Federal lands affected by section 522(e)(4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the right-of-way of a public road or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park or within 300 feet of an occupied dwelling."

EXCEPTIONS

A lease may be issued for land for which the Office of Surface Mining has issued a permit to have public roads relocated.

CONCLUSION

All areas to which criterion number 3 applies are excepted under the above mitigating measure which is applicable to areas to be affected under an operating plan for underground coal mining.

CRITERION NUMBER 4

"Federal lands designated as wilderness study areas shall be considered unsuitable while under review by Administration and the Congress for possible wilderness designation."

Since passage of the Colorado Wilderness Act of 1980 there are no Federal land designated as Wilderness Study Areas within the Known Recoverable Coal Resource Area on the Forest.

CRITERION NUMBER 5

"Scenic Federal lands designated by visual resource management analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable."

EXEMPTIONS

A lease may be issued if the surface management agency determines that surface coal mining operations will not significantly diminish or adversely affect the scenic quality of the designated area.

CONCLUSION

Criterion number 5 applies to those portions of the Known Recoverable Coal Resource Area that have been classified as Variety Class A (distinctive landscapes) or foreground, middleground, and background areas. These areas will

F-3

be considered suitable for leasing because the Forest has determined that the surface effects of underground mining will not diminish or adversely affect the scenic quality.

CRITERION NUMBER 6

"Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study demonstration or experiment, except where mining could be conducted in such a way as to enhance or not jeopardize the purpose of the study."

This criterion does not apply within the Known Recoverable Coal Resource Area.

CRITERION NUMBER 7

"All districts, sites, buildings, structures, and objects of historic, architectural, archaeological, or cultural significance on Federal lands which are included in or eligible for inclusion in the National Register of Historic Places, and an appropriate buffer zone around the outside boundary of the designated property (to protect the inherent values of the property that make it eligible for listing in the National Register) as determined by the surface management agency, in consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office shall be considered unsuitable."

EXCEPTIONS

All or certain stipulated methods of coal mining may be allowed if the surface management agency determines that the direct and indirect effects of mining, as stipulated, on a property in or eligible for the National Register of Historic Places will not result in significant adverse impacts on the property.

CONCLUSION

Cultural resource sites have been mapped within the Known Recoverable Coal Resource Area. All areas containing cultural sites are excepted under 3461.1 (a)(2) because the Forest Service has determined that the effects of underground coal mining can be mitigated and will not, therefore, result in significant adverse impact to the property. The Advisory Council on Historic Preservation and State Historic Preservation Office were consulted.

CRITERION NUMBER 8

"Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable."

There are no natural areas that meet these guidelines within the Known Recoverable Coal Resource Area on the Forest.

F-4

CRITERION NUMBER 9

"Federally designated critical habitat for threatened or endangered plant and animal species, and habitat for Federal threatened or endangered species which is determined by the Fish and Wildlife Service and the surface management agency to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable."

EXCEPTIONS

A lease may be issued and mining operations approved if the proposed activity is not likely to jeopardize the continued existence of the species and/or habitat.

CONCLUSION

Habitat for the following Federally designated threatened and endangered plant and animal species is known or suspected to be present on the Forest.

--Bald Eagle has persistently wintered on the East River and portions of the Gunnison National Forest.

--American Peregrine Falcon critical habitat has been identified on the Gunnison and Uncompahgre National Forest. A suspected active nest site will be investigated in 1981.

--Uncompahgre Fritillary Butterfly is a candidate species known to exist on the Uncompahgre National Forest.

--Whooping Crane is a migrating species seen each spring flying over the Gunnison and Grand Mesa National Forests.

None of this habitat is within the Known Recoverable Coal Resource Area.

CRITERION NUMBER 10

"Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a State pursuant to State law as endangered or threatened shall be considered unsuitable."

EXCEPTIONS

A lease may be issued and mining operations approved if the proposed activity will not adversely affect the species.

CONCLUSION

Habitat for the following state designated endangered or threatened plant and animal species is known or suspected to be present on the Forest.

--Wolverine was reported present in 1977 by Rick Richards on the Gunnison National Forest.

F-5

--River Otter has been introduced in the Black Canyon and has not yet been seen on National Forest System land.

--American Peregrine Falcon (see Federal listed species)

--Bald Eagle (see Federal listed species)

--Whooping Crane (see Federal listed species)

--Greater Sandhill Crane migrate over the Forest each spring and fall.

None of this habitat is within the Known Recoverable Coal Resource Area.

CRITERION NUMBER 11

"A bald or golden eagle nest or site on Federal lands that is determined to be active and an appropriate buffer zone of land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones."

A known golden eagle nest site is on the Gunnison National Forest. The hunting territory of the nesting pair will have to be mapped and possible prey species listed. Neither of these nesting sites is within the Known Recoverable Coal Resource Area.

CRITERION NUMBER 12

"Bald and golden eagle roost and concentration areas on Federal lands used during migration and wintering shall be considered unsuitable."

EXCEPTIONS

A lease may be issued if mining activities can be carried out with such limitations of method and time period that eagles are not adversely affected.

CONCLUSION

No bald or golden eagle roost trees are known to exist on the Forest.

CRITERION NUMBER 13

"Federal Lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and a buffer zone of Federal land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones."

Peregrine Falcons are known to exist on the Forest, but not within the Known Recoverable Coal Resource Area. Critical habitat for American Peregrine Falcon, is mapped. Kestrels are fairly common on open areas up to 9500 feet. The Forest estimates nesting territory and hunting territory therein to be 5 acres per pair. Merlin are not common, the Forest estimates territory of those nesting near riparian sites to be 160 acres.

F-6

CRITERION NUMBER 14

"Federal lands which are high priority habitat for migratory bird species of high Federal interest on a regional or national basis, as determined jointly by the surface management agency and the Fish and Wildlife Service, shall be considered unsuitable."

EXCEPTIONS

A lease may be issued if mining activity will not adversely affect the habitat during use by the species.

These areas are considered suitable for all methods of coal mining under this exception if disturbance to the vegetative cover by surface operations and impacts is minimized.

CONCLUSION

No high priority habitat for migratory bird series has been identified within the Known Recoverable Coal Resource Area.

CRITERION NUMBER 15

"Federal lands which the surface management agency and the State jointly agree are fish and wildlife habitat for resident species of high interest to the State and which are essential for maintaining these priority wildlife species shall be considered unsuitable. Examples of such lands which serve a critical function for the species involved include:

--Active dancing and strutting grounds for sage grouse, sharp-tailed grouse, and prairie chicken;

--Winter ranges most critical for deer, antelope, and elk; and

--Migration corridors for elk."

EXCEPTIONS

A lease may be issued if, after consultation with the State, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

CONCLUSION

Habitat essential for maintaining high interest wildlife species exists on the Forest and falls into three categories:

--Active strutting grounds for sage and sharp-tailed grouse.

--Critical winter range for deer, antelope, bighorn sheep, and elk.

--Cold water fishery for premium or blue ribbon waters.

Only elk and deer winter range are located within the Known Recoverable Coal Resource Area.

The Forest has determined that the surface impacts of underground coal mining will not have a significant long-term impact on the deer and elk herds.

CRITERION NUMBER 16

"Federal lands in riverine, coastal, and special floodplains (100-year recurrence interval) shall be considered unsuitable unless, after consultation with Geological Survey, the surface management agency determines that all or certain stipulated methods of coal mining can be undertaken without substantial threat of loss to people or property, and to the natural and beneficial values of the floodplain on the lease tract and downstream."

CONCLUSION

Each perennial and intermittent stream within the Forest has a narrow floodplain associated with it. Most of the floodplains on the Forest are not planar surfaces and are not composed of fluvial (stream deposited) sediments nor are they characterized by wetlands, riparian habitat, agricultural activities, or building sites. Usually the floodplain is simply a part of the river bed which is inundated during high water and dry during low water. The floodplain, therefore, is typically not an area where loss to people or property is a threat. Moreover, there are few natural and beneficial values to be derived from these floodplains except for the function of channeling flow from the mountains to the lowland valleys where agriculture and development can occur.

The Forest has determined, based on the above characteristics of most Forest floodplains, that the surface effects of underground coal mining will not cause substantial threat of loss to people, property, or the natural and beneficial values of the floodplain. Effects of the underground mining can be mitigated through mining method, monitoring, and restoration. Therefore, all Forest floodplains are considered suitable for coal mining.

CRITERION NUMBER 17

"Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable."

EXCEPTIONS

A lease may be issued where:

--The surface management agency determines, as a result of studies, that all or certain stipulated methods of coal mining will not adversely affect the watershed to any significant degree; and

--The municipality (incorporated entity) or the responsible governmental unit concurs in writing in the issuance of the lease.

F-8

CONCLUSION

There are five municipal watersheds within the Known Recoverable Coal Resource Area on the Forest: Grand Junction, Delta, Cedaredge, Hotchkiss, and Carvin Mesa.

The above studies and consent could not take place until at least a preliminary mining plan had been submitted with the necessary baseline hydrologic data and possible mitigation measures. Therefore, the Forest cannot apply this exception at this time and municipal watersheds as defined above, will be considered unsuitable for surface and underground mining until data is available on which to base an exception.

CRITERION NUMBER 18

"Federal lands with National Resource Waters, as identified by States in their water quality management plans, and a buffer zone of Federal lands one-quarter mile from the outer edge of the far banks of the water shall be unsuitable."

Colorado does not have a Water Quality Measurement Plan that identifies the Forest as having National Resource Waters. This criteria will not be used to declare land unsuitable for coal leasing.

CRITERION NUMBER 19

"Federal lands identified by the surface management agency, in consultation with the State in which they are located, as alluvial valley floors according to the definition in Section 3400.0-5(a) of this title, the standards in 30 CFR Part 822, the final alluvial valley floor guidelines of the Office of Surface Mining Reclamation and Enforcement when published, and approved state programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable."

There are no areas meeting the definition of "alluvial valley floor" within the Known Recoverable Coal Resource Area on the Forest. The criterion will not be used to identify areas unsuitable for coal leasing.

CRITERION NUMBER 20

"Federal lands in a State to which is applicable a criterion (i) proposed by the State, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable."

The Forest does not contain any land identified by the State of Colorado as unsuitable for coal development, therefore this criteria will not be used to determine land unsuitable for coal leasing.

SUMMARY

Table F-1 summarizes the land unsuitable for coal leasing on the Forest. Figure F-1 displays the Known Recoverable Coal Resource Area on the Forest. Figure F-2 displays areas within the Known Recoverable Coal Resource Area unsuitable for coal leasing.

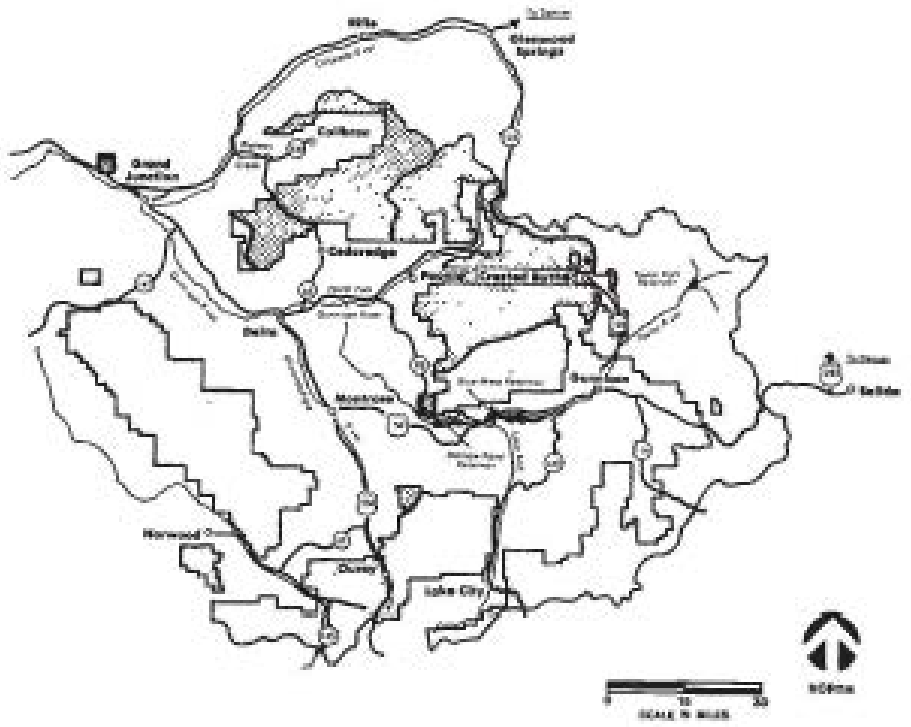
TABLE F-1.

SUMMARY TABLE FOR COAL UNSUITABILITY

Designation	Total Acres	% of Total Forest
Grand Mesa, Uncompahgre Gunnison	2,953,186	100%
Suitable	755,862	26%
Unsuitable	224,491	08%

FIGURE F-1.

AREAS WITH HIGH/MEDIUM POTENTIAL FOR COAL

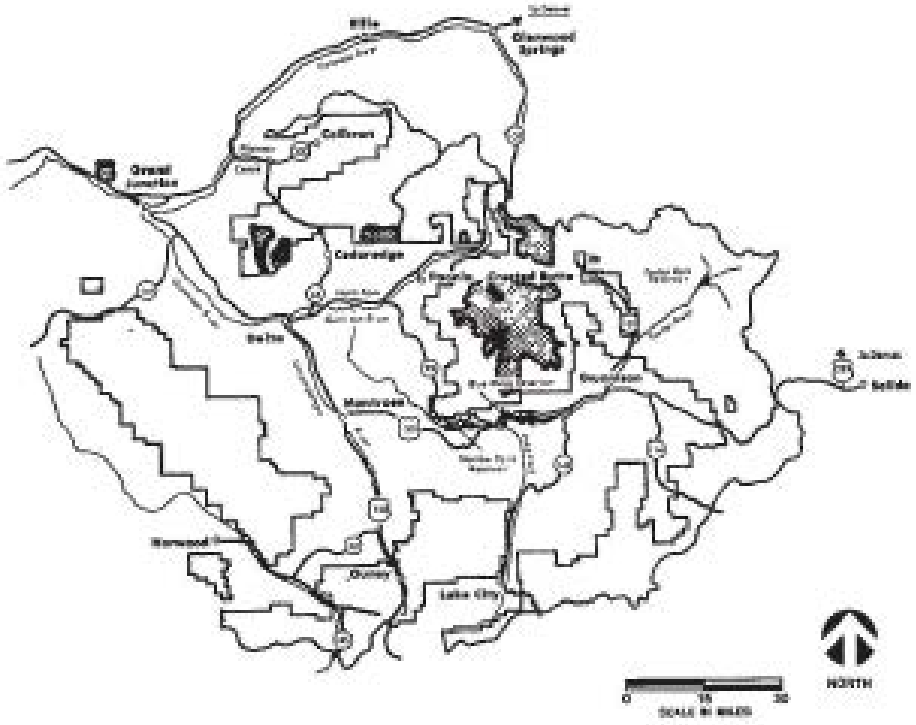


National Forest System Land

Areas with High/Medium Potential for Coal

FIGURE F-2.

AREAS WITH HIGH/MEDIUM POTENTIAL FOR COAL AND
UNSUITABLE FOR COAL LEASING



National Forest System Land

Areas with High/Medium Potential for Coal And Unsuitable for Coal Leasing

APPENDIX F. MCC'S AIR PERMIT

STATE OF COLORADO

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
AIR POLLUTION CONTROL DIVISION
TELEPHONE: (303) 692-3150

CONSTRUCTION PERMIT

PERMIT NO: **09GU1382**

INITIAL APPROVAL

DATE ISSUED: JUN 18 2010

ISSUED TO: **Mountain Coal Company, LLC**

THE SOURCE TO WHICH THIS PERMIT APPLIES IS DESCRIBED AND LOCATED AS FOLLOWS:

Underground coal mining and coal processing equipment, known as the West Elk Mine, located in Section 16, Township 13 South, Range 90 West, one mile east of Somerset on State Highway 133, in Gunnison County, Colorado.

THE SPECIFIC EQUIPMENT OR ACTIVITY SUBJECT TO THIS PERMIT INCLUDES THE FOLLOWING:

Mining operations and processing equipment, controls and production limits, as described on Attachment A of this permit.

THIS PERMIT IS GRANTED SUBJECT TO ALL RULES AND REGULATIONS OF THE COLORADO AIR QUALITY CONTROL COMMISSION AND THE COLORADO AIR POLLUTION PREVENTION AND CONTROL ACT C.R.S. (25-7-101 et seq), TO THOSE GENERAL TERMS AND CONDITIONS INCLUDED IN THIS DOCUMENT AND THE FOLLOWING SPECIFIC TERMS AND CONDITIONS:

1. Within one hundred and eighty days (180) after commencement of operation, compliance with the conditions contained on this permit shall be demonstrated to the Division. It is the permittee's responsibility to self certify compliance with the conditions. Failure to demonstrate compliance within 180 days may result in revocation of the permit. (Information on how to certify compliance was mailed with the permit.)

2. This permit shall expire if the owner or operator of the source for which this permit was issued: (i) does not commence construction/modification or operation of this source within 18 months after either the date of issuance of this initial approval permit or the date on which such construction or activity was scheduled to commence as set forth in the permit application associated with this permit; (ii) discontinues construction for a period of eighteen months or more; or (iii) does not complete construction within a reasonable time of the estimated completion date (See General Condition No. 6., Item 1.). Upon a showing of good cause by the permittee, the Division may grant extensions of the permit. (Reference: Regulation No. 3, Part B, Section III.F.4.)

3. Within one hundred and eighty days (180) after commencement of operation, the applicant shall submit to the Division for approval an operating and maintenance plan for all control equipment and control practices, and a proposed record keeping format that will outline how the applicant will maintain compliance on an ongoing basis with the requirements of condition no.7 listed below. The operating and maintenance plan shall commence at startup. (Reference: Regulation No. 3, Part B, Section III.G.7.)

ver. 2/00

051/0051Mountain Coal Company, LLC
Permit No. 09GU1382Approval Colorado Department of Public Health and Environment
Initial page 2 Air Pollution Control Division

4. Visible emissions shall not exceed twenty percent (20%) opacity during normal operation of the source. During periods of startup, process modification, or adjustment of control equipment visible emissions shall not exceed 30% opacity for more than six minutes in any sixty consecutive minutes. Opacity shall be measured by EPA Method 9. (Reference: Regulation No. 1, Section II.A.1. & 4.)

5. The particulate emission control measures listed on the attached page (as approved by the Division) shall be applied to the particulate emission producing sources as required by Regulation No. 1, Section III.D.1.b.

6. This source shall be limited to a maximum production rate as listed below and all other activities, operational rates and numbers of equipment as stated in the application. Daily records of the actual production rate shall be maintained by the applicant and made available to the Division for inspection upon request. (Reference: Regulation No. 3, Part B, Section II.A.4.)

   Total quantity of material (coal and refuse) handled shall not exceed 59,400 tons per day and 8,500,000 tons per year.

   The total quantity of refuse material shall not exceed 5,000 tons per day from the Coal Prep Plant or 5,000 tons per day from the Reclaim Tower and 1,000,000 tons per year.

   Raw material stockpiles shall not exceed 5.1 acres.

   Processed material stockpiles shall not exceed 4.8 acres.

   Processing of through the Coal Prep Plant shall not exceed 20,000 tons per day and 4,500,000 ton per year.

   Hours of operation for maintenance activities on the three main stockpiles limited to 60 hours/day

   Hours of operation for maintenance activities on the silo stockpiles limited to **40** hours/day

   Hours of operation for maintenance activities on the refuse piles limited to **75** hours/day

7. Emissions of air pollutants shall not exceed the following limitations, and the specific limits in Attachment A (as calculated in the Division's preliminary analysis): (Reference: Regulation 3, Part B, III. A. 4)

   Particulate Matter: 68.8 tons per year.
   PM10 (Particulate Matter<10 μm): 60.3 ton per year.
   Particulate Matter - Fugitive: 85.4 tons per year.
   PM10 (Particulate Matter<10 μm) - Fugitive: 27.9 tons per year.

   Compliance with the yearly emission limits shall be determined on a rolling twelve (12) month total.

   Notes: For AIRS IDs **051/0015/011, 012, 013, 019 & 020**, Coal Processing System: The permit holder shall calculate emissions as defined in Attachment A, based on daily production and keep a compliance record on site in order to demonstrate compliance with the above emission limitations. Annual emissions shall be calculated based on the previous twelve (12) months' emission data. These calculated annual emissions shall be included in the demonstration of compliance with the yearly non-fugitive emission limits listed above.

051/0051 ver. 2/00

Compliance with the fugitive emission limits shall be demonstrated by not exceeding the production limits in condition number 6 and by following the attached fugitive dust emissions control plan.

8. A Revised Air Pollutant Emission Notice (APEN) shall be filed: (Reference: Regulation No. 3, Part A, Section II.C.)

   a. Annually whenever a significant increase in emissions occurs as follows:

      For any criteria pollutant:

      For sources emitting **less than 100 tons per year**, a change in actual emissions of five tons per year or more, above the level reported on the last APEN submitted; or

      A change in actual emissions, above the level reported on the last APEN submitted, of 50 pounds of lead

      For any non-criteria reportable pollutant:

      If the emissions increase by 50% or five (5) tons per year, whichever is less, above the level reported on the last APEN submitted to the Division.

   b. Whenever there is a change in the owner or operator of any facility, process, or activity; or

   c. Whenever new control equipment is installed, or whenever a different type of control equipment replaces an existing type of control equipment; or

   d. Whenever a permit limitation must be modified; or

9. Process equipment at this facility is subject to Regulation No. 6-Standards of Performance for New Stationary Sources, Part A-Federal Register Regulations (40 CFR Part 60) Adopted By Reference, Subpart Y- Standards of Performance for Coal Preparation Plants as amended by a final rule published in the Federal Register on October 8, 2009 (FR Vol. 74, No. 194), including, but not limited to, the following:

   a. Discharge into the atmosphere shall be less than 20 % opacity for any coal processing and conveying equipment, coal storage systems and transfer and loading systems constructed, reconstructed or modified before April 28, 2008.

   b. Discharge into the atmosphere shall be less than 10 % opacity for any coal processing and conveying equipment, coal storage systems and transfer and loading systems constructed, reconstructed or modified after April 28, 2008.

   c. A fugitive coal dust emissions control plan must be submitted prior to startup for any open storage piles of coal constructed, reconstructed or modified after May 27, 2009.

   d. A logbook shall be maintained for a coal preparation plant that commences construction, reconstruction or modification after April 28, 2008, to include the information specified in Subpart Y.

   In addition, the following requirements of Regulation No. 6, Part A, Subpart A, General Provisions, apply.

a. At all times, including periods of start-up, shutdown, and malfunction, the facility and control equipment shall, to the extent practicable, be maintained and operated in a manner consistent with good air pollution control practices for minimizing emissions. Determination of whether or not acceptable operating and maintenance procedures are being used will be based on information available to the Division, which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. (Reference: Regulation 6, Part A. General Provisions from 40 CFR 60.11

b. No article, machine, equipment or process shall be used to conceal an emission that would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard that is based on the concentration of a pollutant in the gases discharged to the atmosphere. (§ 60.12)

c. Records of startups, shutdowns, and malfunctions shall be maintained, as required under § 60.7.

d. Compliance with opacity standards shall be demonstrated according to § 60.11.

10. Transfer points shall be enclosed to minimize emissions of particulate matter.

11. Public access shall be precluded, as per Mountain Coal Company's January 26, 2010 letter to Mr. Jon Torizzo, in all areas within the modeling receptor exclusion zone as submitted with the modeling with the application. Fenced areas shall be posted with no trespassing signs.

12. This source shall be limited to the maximum production rates and emissions controls as listed in Attachment A. Daily records of the actual production rates shall be maintained by the applicant and made available to the Division for inspection upon request.

13. Prevention of Significant Deterioration (PSD) requirements shall apply to this source at any such time that this source becomes major solely by virtue of a relaxation in any permit condition. Any relaxation that increases the potential to emit above the applicable PSD threshold will require a full PSD review of the source as though construction had not yet commenced on the source. The source shall not exceed the PSD threshold until a PSD permit is granted. (Reference: Regulation No.3, Part D, Section VI.B.4.)

14. Operating Permit (OP) requirements shall apply to this source at any such time that this source becomes major solely by virtue of a relaxation in any permit limitation. Any relaxation that increases the potential to emit above the applicable OP threshold shall require submittal of and issuance of an operating permit, under Regulation No. 3, Part C.

15. The applicant shall follow the most current operating and maintenance plan and record keeping format approved by the Division in order to demonstrate compliance on an ongoing basis with the requirements of this permit. (Reference: Regulation No. 3, Part B, Section III.G.7.)

051/0051Mountain Coal Company, LLC
Permit No. 09GU1382Approval
Initial page 5

Colorado Department of Public Health and Environment
Air Pollution Control Division

16. Issuance of this permit cancels the permits contained in the following table. AIRS IDs are not cancelled.

Permit Number
95GU508-1
95GU508-2
95GU508-3
95GU508-4
95GU508-5
96GU736
99GU0832

Charles N. Pray, P.E.-P.L.S.
Permit Engineer

R-K Hancock III, P.E.
Construction Permit Unit Supervisor

Permit History:

Date	Action	Description
This issuance	IA	Initial Approval.

Notes to Permit Holder:

1) The production or raw material processing limits and emission limits contained in this permit are based on the production/processing rates requested in the permit application. These limits may be revised upon request of the permittee providing there is no exceedence of any specific emission control regulation or any ambient air quality standard. A revised air pollution emission notice (APEN) and application form must be submitted with a request for a permit revision.

2) This source is subject to the Common Provisions Regulation Part II, Subpart E, Affirmative Defense Provision for Excess Emissions During Malfunctions. The permittee shall notify the Division of any malfunction condition which causes a violation of any emission limit or limits stated in this permit as soon as possible, but no later than noon of the next working day, followed by written notice to the Division addressing all of the criteria set forth in Part II.E.1. of the Common Provisions Regulation. See: http://www.cdphe.state.co.us/regulations/airregs/100102aqcccommonprovisionsreg.pdf.

3) Per condition number 9 above: AIRS ID **051/0015/011, 012, & 013** were built before April 28, 2008, and shall not exhibit greater than 20 % opacity. AIRS ID **051/0015/020** was built after April 28, 2008 and shall not exhibit greater than 10 % opacity.

4) This facility is classified as a: Synthetic Minor Facility

051/0051

ver. 2/00

051/0051Mountain Coal Company, LLC
Permit No. 09GU1382Approval
Initial page 6

Colorado Department of Public Health and Environment
Air Pollution Control Division

PARTICULATE EMISSIONS CONTROL PLAN FOR MINING ACTIVITIES

THE FOLLOWING PARTICULATE EMISSIONS CONTROL MEASURES SHALL BE USED FOR COMPLIANCE PURPOSES ON THE ACTIVITIES COVERED BY THIS PERMIT, AS REQUIRED BY THE AIR QUALITY CONTROL COMMISSION REGULATION NO.1, Section III.D.1.b. THIS SOURCE IS SUBJECT TO THE FOLLOWING EMISSION GUIDELINES:

a. **Mining Activities -** Visible emissions not to exceed 20% opacity, no off-property transport of visible emissions.

b. **Haul Roads -** No off-property transport of visible emissions shall apply to on-site haul roads, the nuisance guidelines shall apply to off-site haul roads.

c. **Haul Trucks -** There shall be no off-property transport of visible emissions from haul trucks when operating on the property of the owner or operator. There shall be no off-vehicle transport of visible emissions from the material in the haul trucks when operating off of the property of the owner or operator.

Control Measures

1. Phased reclamation and rehabilitation, specified in Permit No. C-80-007 issued by Colorado Division of Reclamation, Mining, and Safety, shall be implemented to minimize emissions of fugitive particulate matter emissions.

2. The surface of the active working area of the coal refuse stockpiles shall be watered as needed. Water shall be applied to any part of a refuse stockpile subject to vehicular activity.

3. Unpaved haul roads shall be treated with chemical stabilizers per manufacturer's recommendations, and watered as often as needed to control fugitive particulate emissions.

4. Reclamation works and sequential extraction of material shall be initiated to keep the total disturbed areas at any one time to a minimum.

051/0051 ver. 2/00

ATTACHMENT A

AIRS ID	Process description	Controls
051/0015/011	Conveyors/Transfers Main Mine Conveyor Conveyor ST-1 Conveyor ST-2 Conveyor ST-3	Emissions of particulate matter from the transfer points are controlled with enclosures. Coal is naturally moist. Throughput is limited to 8,500,000 tons per year of which not more than 1,000,000 tons per year is refuse. Particulate Matter (PM): 6.2 tons per year. Emission factor (EF) = 0.0015 lbs/ton. Particulate Matter<10 μm (PM10): 4.2 ton per year. EF = 0.0010 lbs/ton.
051/0015/012	Coal processing system, design rated at 1,650 tons per hour, and consisting of: One (1) McLanahan, Model: Rotary Breaker, S/N: 154-81, breaker for crushing / sorting of coal. One (1) American Pulverizer, Model: Double Roll, S/N: 7630, roll crusher. Two (2) Tabor, Model: Coal Screen, S/Ns: 4511 and 4512, vibrating screens. One (1) Custom, reject bin. Seven (7) Custom, conveyors for coal and reject.	Emissions of particulate matter are controlled with enclosures. Coal is naturally moist. PM: 51.0 lbs per day and 5.4 tons per year. EF = 0.0013 lbs/ton. PM10: 15.4 lbs per day and 1.6 tons per year. EF = 0.0004 lbs/ton. Compliance with the yearly emission limits shall be determined on a rolling twelve (12) month total. The permit holder shall calculate emissions on a monthly basis and keep a compliance record on site in order to demonstrate compliance with the above emission limitations. Annual emissions shall be calculated based on the previous twelve (12) months' emission data. These calculated annual emissions shall be used to demonstrate compliance with the yearly emission limit listed above.

051/0051Mountain Coal Company, LLC
Permit No. 09GU1382Approval
Initial page 8

Colorado Department of Public Health and Environment
Air Pollution Control Division

ATTACHMENT A CONTINUED

051/0015/013	Two (1) Storage Silos for coal storage. Two (2) Vibratory Feeders. One (1) Train Loadout Conveyor. One (1) Batch Weigh System. One (1) Coal Sampling System	Emissions of particulate matter from the transfer points are controlled with enclosures. Coal is naturally wet. PM: 0.12 tons per year. EF = 2.93 e-5 lbs/ton. PM10: 0.06 ton per year. EF = 1.46 e-5 lbs/ton. Fugitive PM: 5.3 tons per year. EF = 0.0012 lbs/ton. Fugitive PM10: 1.6 tons per year. EF = 0.0004 lbs/ton.
051/0015/014	Storage pile, emergency stockpile, and associated hauling of coal.	Follow Fugitive Dust Control Plan. Fugitive PM 10.7 tons per year EF = 0.024 lbs/ton. Fugitive PM10: 7.9 tons per year. EF = 0.018 lbs/ton. Coal storage areas listed on this permit shall not exceed 4 acres. Truck hauling of coal shall from the silo-pad emergency storage pile to off-site locations shall not exceed 1,000,000 tons per year
051/0015/015	Coal refuse pile and associated mobile equipment and hauling of coal.	Follow Fugitive Dust Control Plan. Production (storage) of coal refuse shall not exceed 1,000,000 tons per year. Fugitive PM: 38.4 tons per year. EF = 0.08 lbs/ton. Fugitive PM10: 11.4 tons per year. EF = 0.023 lbs/ton.
051/0015/0016	Hauling of coal from the ROM storage pile.	Follow Fugitive Dust Control Plan. Truck haulage of coal from the ROM stockpile to off-site locations shall not exceed 500,000 tons per year. PM: 9.2 tons per year. EF = 0.037 lbs/ton. PM10: 2.5 tons per year. EF = 0.010 lbs/ton.

051/0051 ver. 2/00

051/0051Mountain Coal Company, LLC
Permit No. 09GU1382Approval
Initial page 9

Colorado Department of Public Health and Environment
Air Pollution Control Division

ATTACHMENT A CONTINUED

051/0015/019	Coal mine ventilation shafts: Sylvester Gulch:Joy model 120-65-880, 1500 hp Shaft #1 – fan #1:TLT Babcock model GAF 30-15-1, 2500 hp Shaft #2 – fan #1:TLT Babcock model GAF 30-15-1, 2500 hp Shaft #2 – fan #2:TLT Babcock model GAF 30-15-1, 2500 hp Shaft #3 – fan #1:Joy Model MF-65, 1500 hp	Ventilation fans are uncontrolled. Throughput of ventilation air shall not exceed 3,000,000 cubic feet per minute. Shaft #2 fans shall be restricted to one (1) fan at any time. PM: 49.2 tons per year. EF = 11.23 lbs/hour. PM10: 49.2 tons per year. EF = 11.23 lbs/hour.
051/0015/020	Coal Prep Plant Process Equipment: One (1) Conn-Weld, 8X16 Negative Slope, S/N: TBD, vibrating sceen. One (1) Crusher: McClanahan, Black Diamond, S/N: TBD Screen #1: Bivitech, KRL/DD "B" 2400X90x, S/N: TBD Screen #2: Conn-Weld (2) 8X16 Horizontal, S/N: TBD Screen #3: Conn-Weld, 12X20 Horizontal DD, S/N: TBD Screen #4: Conn-Weld, 8X16 Horizontal, S/N: TBD Screen #5: Conn-Weld, 4X10 Negative Slope, S/N: TBD Screen #6: Conn-Weld, 4X10 Negative Slope, S/N: TBD Crusher: McClanahan, Black Diamond, S/N: TBD	All processes are enclosed. Limited to 4,500,000 tons per year of coal processing. Conn-Weld rated at 800 tph. McClanahan rated at 160 tph. Bivitech rated at 800 tph. Operational rate not applicable. "Wet" process APEN exempt. Operational rate not applicable. "Wet" process APEN exempt. Operational rate not applicable. "Wet" process APEN exempt. Operational rate not applicable. "Wet" process APEN exempt. Operational rate not applicable. "Wet" process APEN exempt. McClanahan rated at 200 tph. Wet process. PM: 3.3 tons per year. EF = 0.0015 lbs/ton. PM10 1.7 tons per year. EF = 0.0007 lbs/ton.

END OF ATTACHMENT A

051/0051

ver. 2/00

Additional equipment located at this facility.

AIRS ID	Description	Emissions information
051/0015/009	Fuel storage tanks under 93GU886.XA.	Emissions of VOCs de minimis. APEN exempt.
051/0015/021	Cummins emergency generator under permit 10GU1130.	NSPS IIII certified as Tier 2.
Exempt heaters at various locations.		

051/0051Mountain Coal Company, LLC
Permit No. 09GU1382Approval
Initial page 11

Colorado Department of Public Health and Environment
Air Pollution Control Division

GENERAL TERMS AND CONDITIONS: (IMPORTANT! READ ITEMS 5,6,7 AND 8)

1. This permit is issued in reliance upon the accuracy and completeness of information supplied by the applicant and is conditioned upon conduct of the activity, or construction, installation and operation of the source, in accordance with this information and with representations made by the applicant or applicant's agents. It is valid only for the equipment and operations or activity specifically identified on the permit.

2. Unless specifically stated otherwise, the general and specific conditions contained in this permit have been determined by the APCD to be necessary to assure compliance with the provisions of Section 25-7-114.5(7)(a), C.R.S.

3. Each and every condition of this permit is a material part hereof and is not severable. Any challenge to or appeal of, a condition hereof shall constitute a rejection of the entire permit and upon such occurrence, this permit shall be deemed denied *ab initio*. This permit may be revoked at any time prior to final approval by the Air Pollution Control Division (APCD) on grounds set forth in the Colorado Air Quality Control Act and regulations of the Air Quality Control Commission (AQCC), including failure to meet any express term or condition of the permit. If the Division denies a permit, conditions imposed upon a permit are contested by the applicant, or the Division revokes a permit, the applicant or owner or operator of a source may request a hearing before the AQCC for review of the Division's action.

4. This permit and any required attachments must be retained and made available for inspection upon request at the location set forth herein. With respect to a portable source that is moved to a new location, a copy of the Relocation Notice (required by law to be submitted to the APCD whenever a portable source is relocated) should be attached to this permit. The permit may be reissued to a new owner by the APCD as provided in AQCC Regulation No. 3, Part B, Section II.B. upon a request for transfer of ownership and the submittal of a revised APEN and the required fee.

5. Issuance (initial approval) of an emission permit does not provide "final" authority for this activity or operation of this source. Final approval of the permit must be secured from the APCD in writing in accordance with the provisions of 25-7-114.5(12)(a) C.R.S. and AQCC Regulation No. 3, Part B, Section III.G. Final approval cannot be granted until the operation or activity commences and has been verified by the APCD as conforming in all respects with the conditions of the permit. If the APCD so determines, it will provide written documentation of such final approval, which does constitute "final" authority to operate. ***Compliance with the permit conditions must be demonstrated within 180 days after commencement of operation.***

6. **THIS PERMIT AUTOMATICALLY EXPIRES IF** you (1) do not commence construction or operation within 18 months after either the date of issuance of this permit or the date on which such construction or activity was scheduled to commence as set forth in the permit, whichever is later; (2) discontinue construction for a period of 18 months or more; or (3) do not complete construction within a reasonable time of the estimated completion date. Extensions of the expiration date may be granted by the APCD upon a showing of good cause by the permittee prior to the expiration date.

7. **YOU MUST notify the APCD no later than thirty days after commencement of the permitted operation or activity by submitting a Notice of Startup (NOS) form to the APCD**. The Notice of Startup (NOS) form may be downloaded online at www.cdphe.state.co.us/ap/downloadforms.html. Failure to do so is a violation of AQCC Regulation No. 3, Part B, Section III.G.1., and can result in the revocation of the permit. *You must demonstrate compliance with the permit conditions within 180 days after commencement of operation as stated in condition 5.*

8. Section 25-7-114.7(2)(a), C.R.S. requires that all sources required to file an Air Pollution Emission Notice (APEN) must **pay an annual fee** to cover the costs of inspections and administration. If a source or activity is to be discontinued, the owner must notify the Division in writing requesting a cancellation of the permit. Upon notification, annual fee billing will terminate.

9. Violation of the terms of a permit or of the provisions of the Colorado Air Pollution Prevention and control Act or the regulations of the AQCC may result in administrative, civil or criminal enforcement actions under Sections 25-7-115 (enforcement), -121 (injunctions), -122 (civil penalties), -122.1 (criminal penalties), C.R.S.

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APPENDIX G. EXAMPLE CALCULATIONS FOR AIR RESOURCES

This technical appendix provides additional information on the procedures used to estimate direct emissions for underground mobile sources. It also includes a summary table listing all estimated emissions for the mine.

Horsepower-hour Calculations for Underground Mobile Sources

To provide acceptable emissions estimates and to fully disclose expected direct emissions from the facilities mobile sources, the EPA's Nonroad model (2008a) was used to generate SCC specific emissions factors (grams per horsepower-hour) for the Delta and Gunnison County based equipment inventories for the year 2000. The year 2000 inventory was chosen to be reasonably conservative, with respect to the fleets overall state of control technology integration that would be expected as the inventory equipment ages and is replaced with newer and better controlled sources. To estimate emissions from the sources, staff had to determine a reasonable thermal efficiency (TE) for the SCC groups in order to estimate the total horsepower-hours the annual fuel use would provide to the equipment. This was necessary because the emissions factors derived from the Nonroad model already account for the overall TE of the equipment, as well as some of the other variables, such as deterioration factors, loading factors, etc. The CO_2 emission factor was used to estimate the TE because the model does not rely on a particular control technology, engine class, or equipment type for derivation, and instead calculates the CO_2 emissions rates based on the in-use brake specific fuel consumption (BSFC - reported as pounds of fuel per horsepower-hour), which is essentially static across all horsepower classes for all model years.

Known Parameters:

MCC annual diesel fuel use 670,000 (500k Under, 170k Surface) gal	* source: West Elk Mine
The average density of the diesel fuel is 7.11 lb/gal	* source: LSD MSDS
The LHV based energy density of the diesel fuel is 18,500 btu/gal	* source: Ave. of literature
Conversion: btu/hp-hr = 2,544.43	* source: Common conversion
CO_2 EF = 642.323 g CO_2/hp-hr (2008a)	* source: EPA Nonroad
Carbon content of diesel fuel = 2,778 g C/gal	* source: 40 CFR 600.113
CO_2 : C Molecular Weight Ratio = 44/12 = 3.667 (unit-less)	* source: Periodic Table

Calculate Parameters (Underground Equipment Example)**:**

Total Available Energy of fuel =

500,000 gal x 7.1 lb/gal x 18,500 btu/lb = 65,767.5 MMbtu

Energy Converter to HP (Energy IN) = 65,767,500,000 btu / 2544.43 btu/hp-hr = 25,847,605.34 hp-hr

Convert CO_2 EF of Diesel Fuel to C EF = 642.323 g CO_2/hp-hr x 3.667^{-1} =175.179 g C/hp-hr

Derived hp-hr/gal of fuel from know Carbon Content of fuel = 2,778 g C/gal / 175.179 g C/hp-hr= 15.858 hp-hr/gal

Derived hp-hr from fuel use (Energy Out) =15.858 hp-hr/gal x 500,000 gal **=7,929,026.54 hp-hr**

TE = Energy Out / Energy IN x 100% = 7,929,026.54 hp-hr / 25,847,605.34 hp-hr x 100% **=30.68%**

Conclusions:

The Thermal Efficiency of the underground equipment is approximately 30.68% based on the EPA Model data for CO_2. Although low for typical diesel engines based on the literature, it is realistic for working engines where hp is developed at various RMPs (based on loading and work cycles). Further the EPA Model takes this into account when developing the EFs (see Nonroad Technical Document NR009d "Exhaust and Crankcase Emission factors for Nonroad Engine Modeling – Compression- Ignition"). All emissions estimates are based on the EPA Nonroad Model emissions factors and the total hp-hrs derived in calculated parameter 5 for each equipment class, i.e. underground or surface.

Example Emissions Calculations for Mobile Sources

General Equation for all Emissions:

Emissions (tons) = Total hp-hr (Energy Out[1]) x NR EF_E g/hp-hr x 453.6^{-1} g/lb x 2000^{-1} lb/ton

Where:

EF_E = Either the Underground or Surface Equipment Emissions Factor

[1] For N2O, substitute (Energy In). EF based on fuel use only.

For N_2O (surface)

8,788,185.82 hp-hr x 0.005 g/hp-hr x 453.6^{-1} g/lb x 2000^{-1} lb/ton = 0.048 tons

NO_X (underground)

7,929,026.54 hp-hr x 10.163 g/hp-hr x 453.6^{-1} g/lb x 2000^{-1} lb/ton = 88.82 tons

Table G1. Direct Criteria and GHG Emissions from Stationary and Mobile Sources in Tons (2011)

Stationary Sources	AIRS ID	PM	PM_{10}	$PM_{2.5}$	NMOG	CO	NO_X	SO_2	CO_2	CH_4	N_2O
Aggregates / Mine Vents / Fugitives (09GU1382)	11, 12, 13, 14 ,15, 16, 19, 20	154.2	88.2	88.2[1]	NA	NA	NA	NA	NA	NA	NA
Diesel Storage Tank (93GU866.XA)	09	NA	NA	NA	1.99[2]	NA	NA	NA	NA	NA	NA
Emergency Generator(s) (10GU1130 & Exempt Units)	21	0.39	0.39	0.39	0.66	5.03	10.34	0.13	1,007.47	0.05	ND
MDW & VAM Exhaust	NA	NA	NA	NA	NA	NA	NA	NA	ND	58,663[4]	NA
Misc. Heating Equipment	NA	4.73	4.30	4.36	2.41	35.70	43.88	0.59	51,920.29	0.97	0.91
Mobile Sources[3]	**SCC**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**NMOG**	**CO**	**NO_X**	**SO_2**	**CO_2**	**CH_4**	**N_2O**
Underground Mining Equipment	2270009000	12.64	12.64	12.26	19.37	74.77	88.82	1.21	5,613.98	0.29	0.14
Surface Mining Equipment	2270002036 2270002051 2270002060 2270002069 2270002033	1.90	1.90	1.84	2.31	12.27	26.24	0.41	1,908.74	0.04	0.05
Total Direct Emissions		173.86	107.43	107.06	26.742	127.77	169.28	2.34	60450.48	58663.54	1.1

1 All PM10 assumed to be PM2.5, site specific data is not known. APCD permit 09GU1382 does not include PM2.5 limits or emissions.

2 Emissions based on APEN exemption threshold in attainment area (2.0 tpy).

3 Mobile sources emissions are for exhaust only.

4 The CO_2e of the methane gas is approximately 1,231,919 tons.

Table G.2 EPA Nonroad Emissions Factors (g/hp-hr)

Equipment Type	SCC	PM	PM_{10}	$PM_{2.5}$	NMOG[2]	CO	NO_X	SO_2	CO_2	CH_4[3]	N_2O[4]
Underground Mining Equipment	2270009000	1.446	1.446	1.403	2.216	8.555	10.163	0.138	642.323	0.034	0.005
Surface Mining Equipment[1]	2270002036 2270002051 2270002060 2270002069 2270002033	0.535	0.535	0.519	0.652	3.458	7.393	0.116	537.869	0.010	0.005

[1] Emissions factors from listed SCC (Source Classification Code) equipment was averaged together to produce a composite emissions factor to represent likely equipment present at the facility. The individual equipment emissions did not statistically vary significantly, with the exception of the bore/drill rigs, within the model results. However, the drilling and boring equipment is not expected to be as heavily used as the other surface equipment, and therefore a straight average of all the emissions factors was used to develop the composite factor (conservative) vs. a weighted average which would have considered area equipment population data. Data was not available for site fleet data to produce a facility specific weighted average.

[2] NMOG (Non-Methane Organic Gases) used to represent potentially reactive VOC species that may participate in ground level Ozone formation. NMOG is the sum of crankcase and exhaust emissions.

[3] CH4 is represented from TOG (Total Organic Gases) – NMOG. CH4 is the sum of crankcase and exhaust emissions.

[4] N2O factor derived from EPA Climate Leaders GHG Inventory Protocol (EPA430-K-08-004) Direct Emissions from Mobile Combustion Sources, Appendix A, Table A-6. N2O factor reported as 0.08 g/kg of fuel combusted. Factor was converted to g/hp-hr based on calculated hp-hr from total annual fuel use (Appendix XX, Example TE Calculation).

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APPENDIX H. RESPONSE TO COMMENTS RECEIVED ON DRAFT EIS (RESERVED)

APPENDIX I. COMMENTS RECEIVED ON DRAFT EIS (RESERVED)